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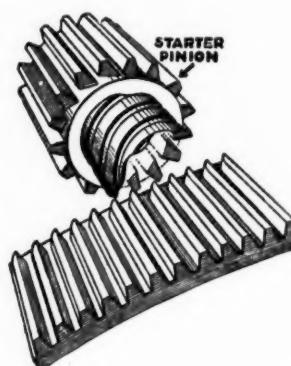
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Automobile

VOL. XLVII

NEW YORK—THURSDAY, NOVEMBER 30, 1922

No. 22

Management Must Be Made to Fit Dominant Buyers' Market

Consumer will dictate for next decade. Demand will be uncertain. High prime costs must be offset by savings elsewhere. Accurate market analysis requisite. Real merchandising essential. Skillful selling operations necessary in fierce competition.

By H. S. Person*

IN the conduct of any enterprise there is a major function, the responsibility for which resides somewhere in the organization, of determining future policy. In many enterprises this function may be regarded lightly or even disregarded on the principle that sufficient unto the day are the problems thereof; but in the larger enterprises, and in all well-managed enterprises of any size, it is not neglected.

It is highly probable that an increasing number of enterprises will come to recognize that policy determination is a function which requires serious and continuous attention. It will involve the ascertainment of and analysis of facts concerning which executives have in the past had little interest, and it will involve, above all, much and careful thinking. It is questionable whether the American executive can be characterized as a thinking executive so much as one intuitioned in reaction to immediate facts; he himself has been proud rather to consider himself a doer and go-getter par-excellence—he who acts and gets while others think. If he is what he believes himself to be, he is the natural product of his economic environment; but one question to be raised is whether there

is not evident a sufficient change in the environment to make any such pride now unreasonable.

The particular phase of the policy problem which we are to consider is presented in the question, "How must executives shape their managements to meet developing industrial conditions?" This question is fundamental for a particular kind of management is an expression of decisions on many other matters of policy.

LET us give our attention first to developing industrial conditions. A first glance is reassuring, for the revival due to follow the acute depression of 1921 is obviously already under way. This is indicated in all the reports of fundamental lines of activity. Bank clearings, car loadings, the production of basic commodities and merchandise distributions have increased; stocks and bonds are more active; the spread between commodity prices has been reduced and in general a possible further long-run decline in commodity prices has been checked by price advances; there is an increase in employment and even in places a shortage of unskilled and skilled labor. Executives are reporting that they are "getting the red ink off their books"; and frequently there appear in the press optimistic utterances of captains of industry.

*Managing director of the Taylor Society, organized to promote the science of administration and management. Digest of paper read at the annual meeting of the society in New York, Nov. 22-24.

But a second, less superficial consideration of conditions causes us to hesitate to join those who believe "it is all over except the shouting." May not this evidence of revival be only the evidence of rebound from the extreme depression and may not the present rate of acceleration be only temporary, to be replaced by a rate more moderate? May not the projection of a curve into the future on the assumption of a continuance of the present rate of revival be a dangerous basis on which to establish managerial policy for the future? The more thoughtful and cautious fear so.

WHEN there is eliminated the activity to supply seasonal and terminable demand, and particularly the intensive activity to supply the abnormal demand for fundamental necessities to which the exigencies of war denied satisfaction—for instance, construction and all the lines of industry attendant on construction—when there is observed the fact that consumers' demand for a wide range of commodities and services is continuing to be hesitant and cautious, there is not left a sufficient amount of evidence to warrant a projection of the curve of industrial activity into the future at its present gratifying slope.

A third and more penetrating analysis, this time of more fundamental conditions, is even disconcerting to those who believe it is all over except the shouting. During the past decade, as a result of the study of earlier cyclic movements, we have learned that certain economic phenomena, such as the quantity of money and credit, have a definite relation to industrial activity. The store of money and credit influence prices and the price movement influences industrial activity. We should recall that the long period of accelerating industrial activity culminating in the frenzy of 1920-21 was coincident with a long upward swing in prices; that in general industrial activity increases in intensity with an upward price movement, is stagnant when there is a downward price movement, and is hesitant and uncertain in the early years of a new stable price level.

Of course, the ideal condition is a fairly stable general price level, but when a condition of stable price level suddenly confronts an industrial generation which has become accustomed to a consistent upward price movement over a long period, the new condition of stability, because different from the accustomed, is upsetting to the individual, either as a demander or producer, and it takes a considerable period, measured not in months but in years, for him to learn just what he can safely do both in purchasing and in producing.

During recent years some sound work has been done in the analysis of fundamental industrial conditions and tendencies, which has given a basis for policy determination more substantial than anything we had previously had. It may be observed that during the past three years of experience wholly new to us, the forecasts of these investigators have "called the turn"

more accurately than the prophesies—or guesses—of business men.

These investigators have succeeded in making some accurate measurements of basic elements which determine price conditions for a number of years ahead and the safest judgment to accept is that, in the words of the Harvard Committee on Economic Research, "the present price level is substantially that around which the fluctuations of the business cycle must play" for the next ten years.

The conclusion I would have you draw is that for, say a decade, a consumers' demand is likely to remain so hesitant and uncertain as to be out of proportion to our capacity to produce. It does not seem necessary for me to give this particular audience any proof that the war has disclosed that our capacity to produce far exceeds anything we had believed it to be. Now I put this question to you as practical managers: If our productive capacity is great, and if it can be made much

greater simply by eliminating sheer idleness, and if consumers' demand is fairly certain to be hesitant for the coming decade, have you or have you not a really critical management problem confronting you?

However, before considering the kind of management that problem is going to force upon you, I want to make one more, a fourth, analysis of present industrial tendencies, painting the picture upon a large canvas. Let us give the picture a striking American title: The Overland Trail—from a dominant sellers' market to a dominant buyers' market. We all appreciate that we are now in at least a temporary buyers' market; I am suggesting that we are on the trail to a dominant buyers' market and that we are possibly

already on the great divide. If we are, we shall learn to manage our enterprises differently.

A summary review of the industrial history of the United States should make it patent that we have been brought up in a sellers' market. We have been pioneers—explorers, appropriators and exploiters of a vast continent of extraordinary resources. It has been a California of '49, or a Klondike, on the scale of a continent and a century. The exploitation of resources which have always had an immediate world market and cash value, the appropriation of stores of capital and treating it as income has given our population a geometrically increasing purchasing power.

CONSUMERS' demand has kept ahead of and pulled along producers' capacity to satisfy the demand. We consumers have crowded about producers with outstretched hands full of purchasing power, begging them to give us something we could wear, eat, drink, parade before our friends, or otherwise enjoy. We have been drunk with a hoard of wealth and we have spent it like drunkards. As producers we bent every effort to satisfy this demand, and we have constructed for ourselves a tremendous productive equipment. As producers and distributors, we were willing to get while the getting was good.

There were signs before the war that the industrial development of the United States was approaching that stage of evolution. Natural resources had become pretty well appropriated and capitalized, not only such resources as mines, forests and natural transportation routes, but also agricultural lands, for there was before the war an increasing proportion of tenant farmers, paying rent in cash or shares. Serious students were concerned over this tendency. Technical productive equipment was at the same time greatly increased, and there was no sign of a plan or even a clear intent to develop foreign markets.

President McKinley's turn, just before his death, toward a reduction of the tariff obstacle to the development of foreign markets made no impression on the dominant political party, and there continued a period of tariff policy which has culminated in the Fordney-McCumber bill. It seemed to thoughtful observers that the quarter century before the war was a period of conscious or unconscious eat, drink and be merry, for to-day we are getting ours and to-morrow will take care of itself.

Then came the war, which was a tremendous shock to the industrial system. On the one hand it caused a still greater development of productive capacity, financed out of future earnings through the mechanism of bonds and taxation, and caused a coincident decline in consumers' demand (the frenzy of 1920 was but an unsubstantial flare up) a decline which is likely to continue for some time because of the continuing heavy taxes and maladjustments caused by the war. In short, the shock seems to have hastened evolutionary tendencies which would have developed more gradually and with only relatively minor depressions, and to have thrown us suddenly upon a buyers' market which will last for some time and may be the beginning of a dominant buyers' market.

A buyers' market means, for competitive industries, a strife for the consumers' dollar which makes so-called competition on a sellers' market seem but a children's game. In view of all these considerations, I think you will agree with me that there was never a time when management should have more concern over future policy—and over the quality of its future management.

MANAGEMENT on a buyers' market is quite a different thing from management on a sellers' market. On a sellers' market selling is but order-taking; on a buyers' market it must be real merchandising. On a sellers' market production is but the hasty and wasteful process of giving material things a form or other quality which will satisfy insatiable and not over-critical demand; on a buyers' market it must be more precise and economical. On a sellers' market financing is largely borrowing on the assumption of unexploited natural resources or an unexploited upward market; on a buyers' market it is a

borrowing on demonstrable future earned profits.

On a sellers' market the conduct of a business is easy and management is simple—in fact there does not have to be any real management. But now that you appear to be face to face with a buyers' market and the necessity of developing real management, if you are to be successful in a most intense competition, if your competitor, instead of yourself, is to be the one to disappear in some readjustment of productive capacity to consumer demand, it is expedient for you to inquire into the nature of that real management.

THE essential practical elements of the problem confronting that management may be summed up as follows:

On the side of supply there is a tremendous production capacity involving heavy investments of capital in more or less specialized equipment to preserve the value of which will require a continuation of the lines of activity for which it was designed. On the side of demand there is a conservative and hesitant market—in fact, a buyers' market—which will continue for a considerable period. This will mean intense competition on the part of management to find the individual consumers and to sell them. In that competition selling price and cost of production will be critical factors. The hesitant market will tend to force selling price down, while higher prices of certain elements entering into cost will tend to keep that figure up.

The fact cannot be disregarded that, as was the experience after both of our earlier great wars, wages have settled at a new high level, and that the strength

of organized labor and new immigration policy seem sufficient to hold them there during such a period as will determine the success or failure of competing enterprises. It should be observed also that many of the basic materials of industry are more or less closely controlled, and that material costs are likely to remain high. Therefore, management will be faced by high prime costs in the face of great pressure to reduce the selling price of fabricated products. The way out for the successful competitor appears to be this:

To develop an inclusive system of management which will more than compensate for high prime costs by cost savings elsewhere, thereby effecting lower factory costs and making possible lower selling prices.

In the first place that management will give more attention to such problems as long run tendencies in the industrial environment. These matters will no longer be regarded as merely "theoretical"; they will be regarded as very practical. Certain major executives will give more thought to policy and general plans and not permit themselves to become too much absorbed in operating details and worn out by late afternoon worries. They will not confine their reading to the news headlines and market

quotations of newspapers, but will read under the headlines, search for the facts and do some thinking of their own.

That management, in the second place, will provide for a more accurate judgment of the market with respect to the demand for the commodities it has to offer, competitors' ability to supply the demand, and what share of the market it can have reasonable expectation of securing. It is with the consumer that the impulse for industrial activity begins—"the consumer is king"; but on a sellers' market consumers are so numerous and insistent that we forget the source of the impulse and come to believe that it starts with the producer. Under the competitive conditions of a buyers' market, managers will see that in true perspective.

Estimating Demand

MANAGERS will learn that they cannot afford to mis-judge demand, either with respect to what it wants, how much of that it wants, or what share of it competitors will permit a particular enterprise to provide. Excessive inventories are fatal on a buyers' market. An enterprise must avoid that by some unit of the organization, whether it be an individual or a group, which will make continuous and precise analyses of the market and provide the data for master plans and schedules.

In the third place, that management will set up in writing on the basis of the data secured by market research, definite master plans, budgets and schedules of operations for a considerable period ahead, these being supported by definite and interdependent detail plans and schedules for the major operating departments—selling, production and financing respectively. These master plans and schedules, and these supporting departmental plans and schedules, will be standards of performance, goals to strive for, lines to which to hew. To do without such plans and schedules means guessing, taking chances, departments out of alignment, unbalanced inventories, higher costs—losses for which the consumer willingly pays the price on a sellers' market, but which, on a buyers' market become a loss to the producer which he cannot afford when competition is intense.

That management, in the third place, will have to conduct its selling operations with more skill than it has ever displayed before. On a sellers' market the consumer seeks the producer; on a buyers' market the producer must search out the consumer and sell him, in the midst of a keen competition both of other producers of the same commodity and other users of the consumers' dollar. Just as there must be no misjudgment of the market, lest there be unsold inventories; no failure to make precise plans and schedules, lest there be unsold inventories; so also there must be no failure to search out and sell to the estimated number of consumers or there will be unsold inventories.

Are we able to imagine the detail changes which are likely to follow the development of the new merchandising? Is it not probable that there will be less of that advertising whose object is to create new wants in satisfaction of which consumers would spend surplus dollars, and more of that advertising whose object is to convince concerning the quality of staple merchandise offered in competition for the limited supply of dollars?

Will not the work of salesmen be something besides either mere order-taking or mere psychological suasion; is not the salesman more likely to spend more time searching out prospects; calling on prospects as well as established customers; skilfully displaying the merits of goods; rendering intelligent—even scientific—service; planning and scheduling his work.

Will not the supervision of sales executives and their

assistants be more comprehensive and more skilful—again, more scientific—than anything we have seen; salesmen better selected, better trained, their work better planned and scheduled and given more intelligent and effective support by the directing staff? Will not the channels of distribution be more carefully studied and more discriminately selected?

I have called attention first to market analysis, master plans and budgets and selling, as conspicuous features of the new management, not because they are superior in importance to other phases of management, but because they logically come first—the point of origin from which to lay out the operations of an enterprise being the consumer—and because in the sellers' market of the past, these phases have been most neglected. It is not to be assumed, however, that I attach less importance to better production methods of a feature of the new management.

There are some who assert that the production problem is solved and that we should now give most attention to other phases of management. I believe they are too hasty in their judgments, especially if we are thinking in terms of a severe competition on a buyers' market. The production problem is far from solved. It is true that we know more about good production management than about good sales management, and that we have a body of production management principles and practices at our command which, if utilized, would eliminate waste, reduce costs and permit cost and price reductions to an astonishing extent; but it is equally true that they are not generally utilized, and the educational task of bringing about their utilization in a plant is as difficult and time-consuming a task as developing market analysis and improved selling methods. Perhaps more so, for the development of market analysis, master planning and selling is the problem of a small group of specialists, while the development of superior production methods is a problem involving the precise co-operation of many individuals of varying capacity for co-operation.

Furthermore, the more severe the competition the more important become good production methods. For in the final analysis, no matter how accurately we gage the market, how precisely we prepare schedules of operations, how skilfully we sell, the greatest weapon in competition is the combination of a dependable product, a dependable service and a quotation lower than competitors, and it is superior production methods which contribute most to making this weapon possible. If you can safely and consistently quote a lower price for an identical commodity and have a reasonably good selling organization, your competitors will hold you in dread.

Accurate Production Necessary

IN the fourth place, therefore, the superior management of the next decade will develop the production department to a high degree of precision in accordance with principles and methods already formulated and available. As some strong merchandisers secure their profits by taking discounts, so strong manufacturers can take their profits by eliminating waste—the waste of useless or unused plant; the waste of useless, unused or inefficiently used equipment and tools; the waste of unsuitable, inadequate or lost materials; the waste of inefficient methods; the waste of improperly chosen, improperly assigned, improperly instructed and inadequately trained workers.

Investigations and experiments will be conducted which will disclose the best equipment, tools, methods and materials for the fabrication of the product and on the basis of the discovered best details will be established standards of product equipment.

Single-Sleeve Valve Engine Adapted to Various Automotive Uses

Burt and McCollum design, formerly known as Argyll, gradually attaining wider use in England. London General Omnibus Co. has secured good results with it in recent preliminary tests. Used for passenger car, truck, tractor and portable applications.

By M. W. Bourdon

THE single sleeve valve engine known variously as the Argyll, Burt and McCollum and, latterly, as the Wallace, was originally introduced in the Argyll car—a Scottish production—as far back as 1911. Although it has been continuously used in that make of passenger car from that time, only during the past two or three years has it made headway in other spheres, with the exception of its being also used since before the war in the Swiss Piccard-Pictet car.

Since the war the Burt and McCollum patent rights in Great Britain have been secured by Scottish interests,

and as a result this valve design has been adopted and is now being made on a commercial basis for passenger cars, trucks, motor cycles, agricultural tractors, marine engines, house-lighting sets and portable power plants by various firms operating in the different spheres. In addition, the London General Omnibus Co., after testing a sample engine submitted to them—one designed for truck use—secured such good preliminary results that it has in hand half a dozen experimental engines of its own special design for bus work embodying this type of valve, the object being to try these engines out in

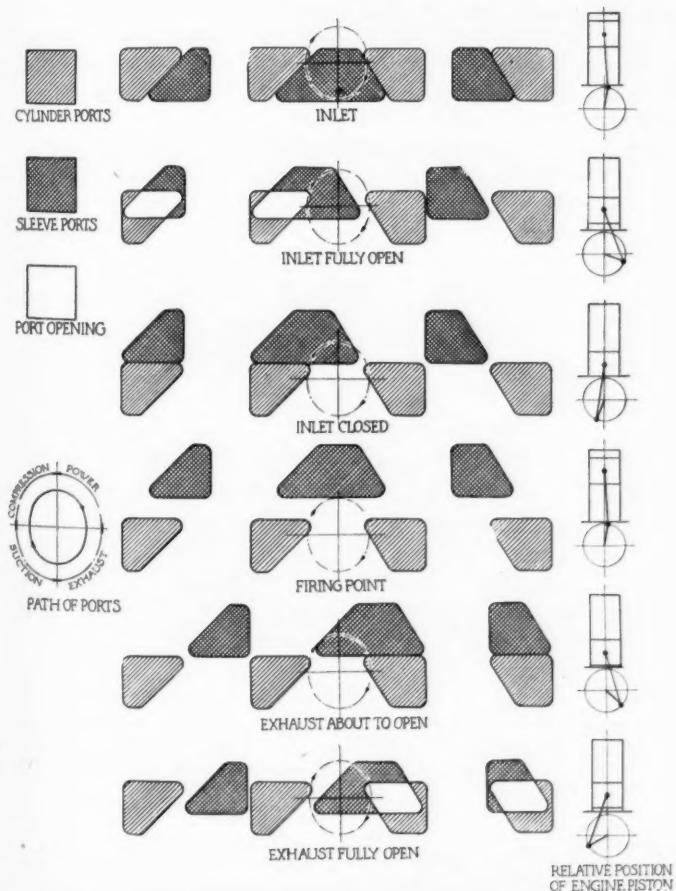


Fig. 1—Diagram showing development of ports and their positions during cycle of the Wallace single-sleeve valve engine

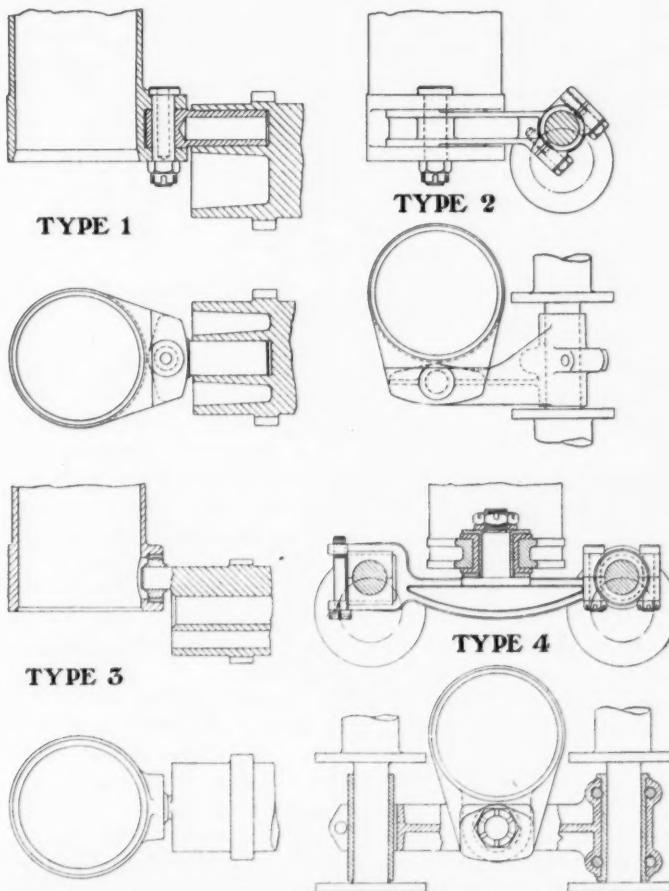


Fig. 2—Four types of actuating gear used in Wallace single-sleeve valve engine

actual service alongside the poppet valve engines now standard in London buses.

The L. G. O. is not in a position to allow the details of its own application of the principle, with the modifications which it considers are desirable for bus work, to be made public at present, nor will it commit itself to any definite opinion as to the possibility of this valve system being standardized for London bus work until it has conducted a great many more tests continuing over a lengthy period.

The essential difference in design between this single sleeve valve engine and the conventional poppet valve type lies in the valve and valve actuating mechanism; the parts are not necessarily different.

The sleeve valve has port openings cut on its circumference to correspond with ports cut in the circumference of the cylinder bore. By means of a suitable driving mechanism, a partly reciprocating and partly rotat-

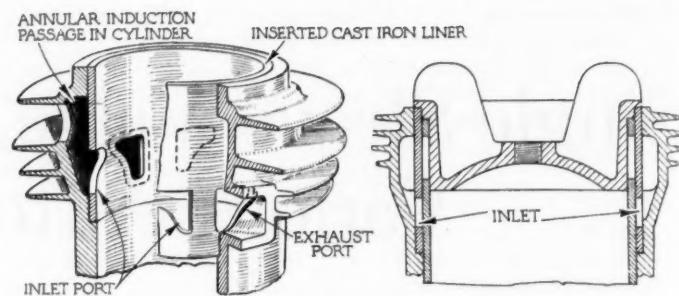


Fig. 4—Wallace valve arrangement in an air cooled cylinder

to reduce oil shear between the valve and the cylinder, and also between the piston and the valve, the latter, it may be noted, being devoid of oil grooves or scrapers. The motion, it is claimed, also helps in the transference of the heat lost to the cylinder walls and to some extent in baffling the gases against leakage. Junk rings are not fitted to the cylinder head as in most other sleeve-valve designs.

Large Water Spaces Provided

The cuts show the large water spaces which can be had at all points in this type of engine. Water passages are cast between the exhaust port cores to convey the cooling water from the bottom of cylinder to the top and at the same time to present a water-cooled surface to the edges of the valve exhaust ports as they pass between the cylinder ports. The exhaust ports are therefore in contact with water-cooled surfaces for three-fourths of the valve cycle. The top end of the cylinder is closed by the detachable head, which, being of the same diameter as the piston, and projecting into the cylinder, forms an annular space in which the upper end of the valve works.

Many different drives have been designed to actuate the valve, the principal of these being shown in Fig. 2. Type 1 is the original drive as fitted to the early Argyll engines; it gives good service but is somewhat heavy and expensive to manufacture. A valveshift (not shown) geared to the crankshaft has a small worm wheel oppo-

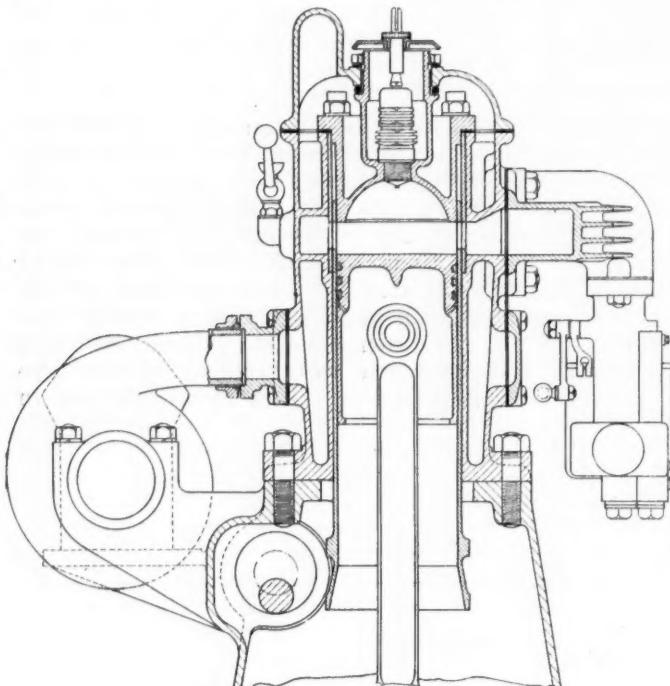


Fig. 3—Sectional view of an 80 x 130 m.m. engine embodying the Wallace valve

ing motion is imparted to the sleeve valve so that joints on it travel in a more or less elliptical path.

With the four-stroke cycle engine the sleeve valve is driven at half engine speed and the ports thereon are arranged so that during the first portion of the upward valve stroke the inlet ports uncover the corresponding ports in the cylinder wall. During the compression and power strokes the sleeve valve is at the top portion of its travel and the port end is covered by the water-jacketed cylinder head. On the last portion of the downward stroke of the valve the exhaust ports in the cylinder are uncovered and the cycle is completed.

The cycle of movement will be made clear on reference to Fig. 1, which shows a development of ports, with the relative positions of valve stroke to engine stroke indicated at the side. It will be observed that when the sleeve valve is subjected to the maximum pressure—that is, during the compression and power strokes—it is traveling in the same direction as the piston. During operation the valve never comes to rest, and at no time is there a sudden reversal in direction of travel.

The peculiar twisting motion of the valve has inherent advantages. The natural spreading of lubricant is said

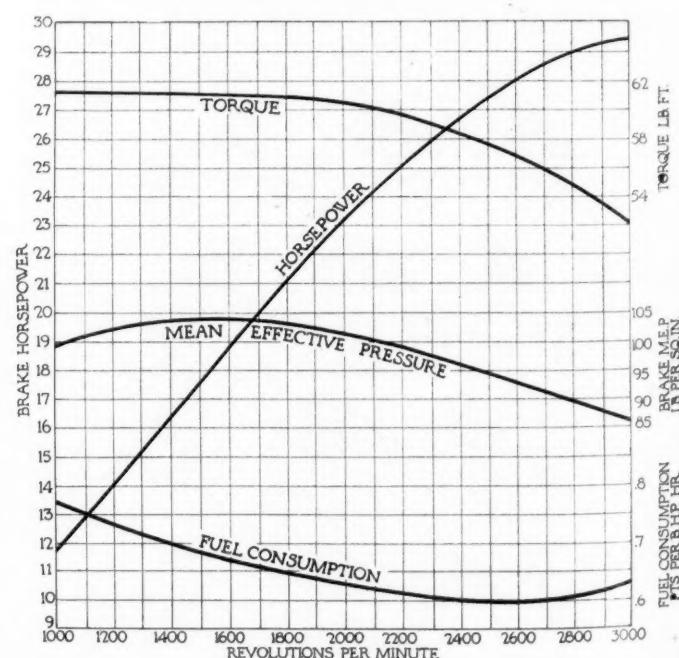


Fig. 5—Power, b.m.e.p., fuel consumption and torque curves of four-cylinder 68 x 103 m.m. engine of 5 to 1 compression ratio fitted with Wallace valves

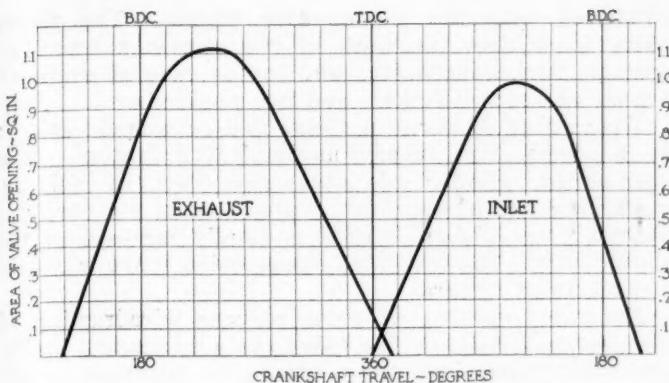


Fig. 6—Valve opening diagram on one engine using Wallace valve

site each engine cylinder; this wheel engages with a disk wheel which revolves at half-engine speed.

On the face of the disk wheel, parallel to and at a fixed distance from its axis, a hole which may be called the sleeve crank is located and in this hole an actuating pin is free to slide. The head of the pin is flattened and fits between the lugs at the bottom of the valve. It is held in position by a pivot pin which passes through corresponding holes in the actuating pin and sleeve-valve lugs. The actuating pin works in and out of the sleeve crank hole and sideways between the sleeve-valve lugs.

As the sleeve crank revolves with the actuating pin, it carries the sleeve valve with it, so that the valve itself, besides traveling up and down also travels sideways on either side of the cylinder axis.

Type 2, known as the link drive, obviates the use of gear wheels. A valvshaft or small thrown crankshaft is driven at half engine speed from the engine crankshaft. Opposite each cylinder is a crank pin and mounted on this is the actuating link. One end of the link has a bushel boss which is free to slide axially on the crankpin, while the opposite end is flattened and engages between two lugs cast integral with the sleeve. A pivot pin fitted

through the lugs secures the link thereto but allows relative movement between the two in a horizontal direction.

In type 3 a ball-and-socket coupling, which obviates the accurate fitting of other drives, is employed. A half-speed crankpin driven from a gear shaft is inserted into the bore of sphere, which in turn is located in a fixed spherical housing at the lower end of the valve. As the crankpin revolves the valve is carried up and down as well as sideways. The ball coupling has a small reciprocative movement along the crankpin. It will be seen that this drive occupies less space and is lighter in weight than the others. It also gives a larger port opening for a given valvshaft stroke.

Type 4 shows the drive used for many years on the Piccard-Pictet cars. It is simply type 1 elaborated to give better lasting qualities.

Alternative Cylinder and Port Designs

There are certain alternative cylinder and port designs, and one of the former is shown in Fig. 3. Here, it will be seen, a separate liner is inserted in the upper end of the cylinder bore, the ports being cut in this liner while passages are formed in the cylinder block in such a way as to permit of placing inlet and exhaust manifolds on the same side. The latter feature can, however, be provided in any event, hence the separate liner is recommended as a rule only when a multiplicity or the small size ports makes direct cutting in the cylinder wall a somewhat difficult operation. A separate liner is used on experimental engines to enable various port settings to be tried with minimum outlay.

The number and arrangement of the ports in both cylinder and sleeve can be varied. In one type the inlet and exhaust ports in the cylinder are arranged alternately while the sleeve ports serve for both inlet and exhaust. An example of an air-cooled cylinder with this arrangement is seen in Fig. 4. A cylinder liner is used and the four exhaust ports lead to Y-branched exhaust pipe on each side of the cylinder, while the inlet ports are in communication with an annular passage above the port

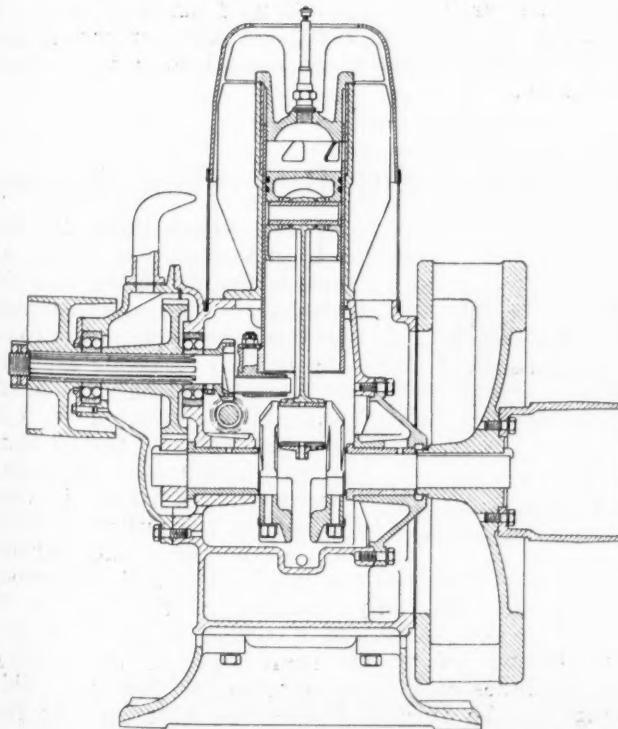
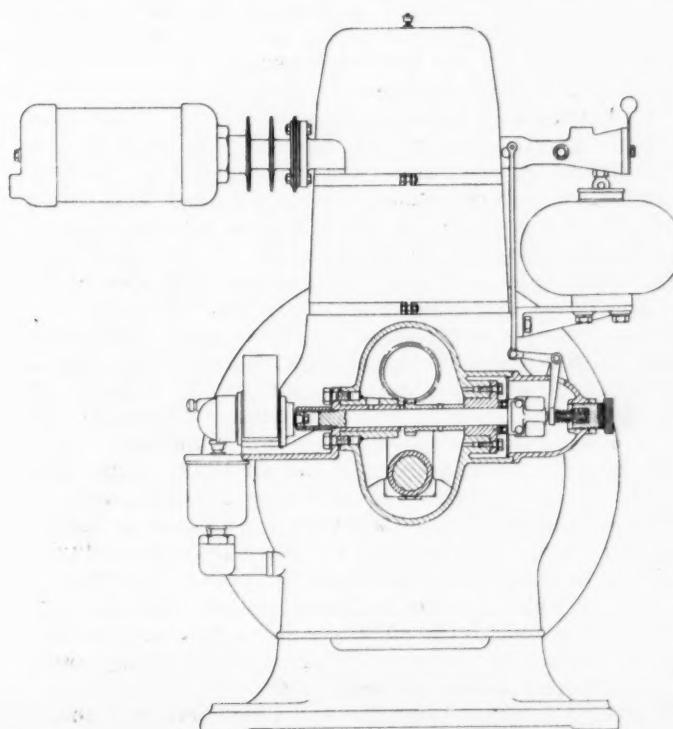


Fig. 7—3 1/4 x 4 in. single-cylinder farm engine using Wallace valve



line. This is an arrangement which is at present in production only on a racing motorcycle engine. It has advantages in absence of cylinder distortion due to the even distribution of heat, in the fact that the annular passage forms an integral induction pipe suitably heated to assist vaporization, and because the position of the ports promotes inlet gas turbulence and breaks up the exhaust. Incidentally, too, a smaller valve shaft throw is required for a given port area. The disadvantages are: intricate coring of the cylinder and the difficulty of collecting the exhaust gases into a common manifold when a multi-cylinder engine is in question.

Sleeve Valve Construction

A port which acts alternately as inlet and exhaust is advisable when maximum openings are desired, two single ports with a wall between would obviously use up more of the sleeve-valve circumference than a single double-purpose port.

The sleeve valve is usually centrifugally cast of good quality gray iron, and for engines up to $2\frac{3}{4}$ -in.-diameter bore is made 0.1 in. thick, while for engines of $4\frac{1}{4}$ -in.-diameter bore a sleeve 0.25 in. thick is said to be quite satisfactory.

The valve timing varies according to the type and speed of engine.

Simplicity, silence and sustained efficiency are the advantages claimed for the single-sleeve-valve engine

compared with the poppet-valve engine. The sleeve valve alone does the work of two poppet valves, two springs, two tappets, etc., and in the case of overhead poppet valves two rockers and two pushrods.

The cutting of ports in sleeve and cylinder is said to be a simple and speedy mechanical operation. The open-ended cylinder has advantages both in molding, machining and assembling. Valve covers, etc., are unnecessary, as the valve gear is totally inclosed in the engine body. The machined compression space is devoid of pockets or corners.

The rapid opening of ports reduces wiredrawing of the charge at high engine speeds to a minimum. Being positively driven the valve timing is constant at all speeds. A valve-opening diagram for one example of ports is given in Fig. 6. This diagram was obtained by drawing one inlet and one exhaust port on an enlarged scale, superimposing one on the other and taking readings by planimeter at regular distances as the sleeve crank travels.

Power m.e.p., fuel consumption and torque curves relating to a 68 x 103-mm., four-cylinder engine are given in Fig. 5.

In addition to the passenger cars mentioned the engine is used in Caledon trucks and in tractor and portable power plants manufactured by Wallace, Ltd. A $3\frac{1}{4}$ x 4-in., single-cylinder farm engine made by this concern is shown in Fig. 7.

Westinghouse Develops Air Brake for Automobiles

NEWLY developed Westinghouse air brakes are fitted on the Fageol motor coach which has recently been driven from Chicago to New York. The chassis of this Fageol bus was described in AUTOMOTIVE INDUSTRIES of May 11, 1922. Details of these new air brakes, which were developed by the Westinghouse Pacific Coast Brake Co., have not been available heretofore.

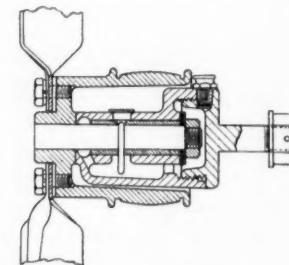
The brakes are fitted to the rear wheels. The axles are of Timken make, and on the rear axle there are the usual Timken dual brakes with brake shoes of quadrant form. Gases or combustion from the first and fourth cylinders are used, which are stored in a pressure tank. The brake operating mechanism is of the diaphragm type, there being one brake chamber on each side of the coach. These diaphragms are of rubberized fabric and against them the pressure of the gases acts. The travel range of the center of the diaphragm is $1\frac{1}{8}$ in. One of the two sets of brakes can be operated by a pedal and the other by a brake lever in the usual way, while both are simultaneously applied by the air chambers.

The most interesting part of the air brake is the valve employed for applying and releasing it. This valve is known as an automatic lap valve. It gives a definite pressure for every position of the valve lever during both application and release. This feature insures flexibility of braking action. There are no definite steps in the variation of the pressure for a gradual increase and decrease and the pressure can be held at any value. The pressure valve is foot-operated.

During a demonstration the coach was driven at speeds exceeding 40 m.p.h. over New Jersey roads. Owing to

the large pneumatic tires, the wide spring centers and the low center of gravity, the coach rides smoothly and steadily. The pneumatic brakes proved very effective, causing the coach to be pulled up from high speeds in remarkably short lengths without that unpleasant sensation sometimes experienced when brakes are jammed on and grab.

Radiator Fan with Ring-Oiling Bearing



Arrow radiator fan with ring-oiling bearing

THE Arrow Pump Co. has placed on the market an automotive fan fitted with the company's ring oiled bearing. In this construction, the bearing and oil reservoir are held stationary and only the shaft and pulley rotate. This, it is claimed, prevents the oil from being thrown out, as occurs where the lubricant is contained in the pulley, a rotating part. The chief advantages claimed are positive lubrication and dust-proof construction. The only opening in the bearing is shrouded by the pulley and a curtain of oil being constantly thrown off by the shaft into the oil recovery space precludes dust from entering the bearing. This bearing will be furnished with the different size fan blades at the holding end.

Argentine Show Breaks Records for Sales and Attendance

Passenger cars comprise large part of exhibit. All other automotive products, however, are well represented. Buying conditions favorable throughout the country. Many locally built de luxe bodies shown. Larger building for next year.

BUENOS AIRES, ARGENTINA, Nov. 24 (By Cable).

NEW records in both attendance and sales were made during the fifth annual automotive exposition, which was held in the Pabellon de las Rosas here the ten days ending Nov. 19, under the direction of the Automovil Club Argentino and the Centro de Importadores de Automoviles y Anexos. Passenger cars, trucks, tractors, motorcycles, equipment, tires and lubricants were shown in such numbers that the main building was insufficient to house them and it was necessary to erect temporary structures to provide additional exhibit space.

The crowds in attendance were large at all times, this year setting new totals. This happy result is largely to be explained by the general expansion under way in the automotive development of Argentina, resulting from many causes. Crop conditions during the growing months have been ideal and practically all agricultural products give promise of bumper yields, for which good prices are anticipated. This has permeated the entire commercial and business structure of Argentina with a greater degree of optimism than has been the case for many months. Practically normal conditions are promised in regard to nearly all Argentine business, except that of the cattle and meat trades and, even here, there has been something of a betterment since the spring season set in.

In addition to the bettered business conditions, progress is being made in the development of highways and there is some increase in overland touring. Exchange is reacting more favorably to Argentina, enabling the distributors and dealers to quote better prices on nearly the entire range of automotive products. The old stocks of automobiles have been cleared out and, as a result, dealers are enabled to offer new models to their clients.

Passenger Cars Predominate

THE show this year was largely devoted to passenger cars, both truck and tractor makers having exhibited in but small numbers. In the passenger car lines, it was predominantly American, a survey of the exhibits showing twenty American, three French, four Italian, four British and four German lines, the American cars well outstripping in number all competing makes. Four American truck lines were shown, against five German and one British. The motorcycle section brought together three exhibits, two of them from America and the third from Italy. The equipment showing was large, including a number of accessories locally made. One section of the show was taken by the Ford company, which set up a

miniature assembly plant. The output was sold as fast as the vehicles could be completed.

An interesting and significant feature was the large number of de luxe bodies of local make. This likewise was one of the high spots of last year's showing but this year it was even more pronounced. Body building plants here have been developed to a high point of efficiency and many excellent bodies were shown, these being mounted on all sorts of chassis.

Six-cylinder models, in point of numbers, somewhat exceeded the fours. Twenty cars were powered with sixes, against seventeen with the smaller engines. Five cars were shown with eight cylinder power plants, two of which were of the eight-in-line type and three of the V type. Twenty-five makes were equipped with high tension magneto. Four lines were offered with optional electrical equipment, of either magneto or battery.

Design Features

ENGINES with overhead valves totaled seventeen, as against twenty-five with valves in the side, and two were valveless. Only one car was equipped with two carburetors. Pump cooling was far in the lead, twenty-four engines using this type of circulation as compared with fourteen having thermosyphon systems. Multiple disc types of gearshifts were used on a majority of the cars. Only one air cooled model was exhibited.

Eighty local importers and dealers participated in the exposition. As regards the most favored type of car, statistics of the show revealed little, the 7-passenger phaeton models numbering 20 and the 5-passenger models only one less. Two roadsters were shown.

The exposition, as it does each year, drew many distinguished visitors from Argentina and the neighboring countries. President Alvear, who has newly taken office as the head of the Argentine State, was in attendance, as were also the governors and officials of many of the provinces. The crowds were entertained by military bands and wireless concerts.

The success of the show had been anticipated beforehand and the results are such as to prove that all of these hopes were warranted. One result of this exposition will be an impetus to the erection of a larger and more commodious building to house future showing. This has been a demand of the automobile distributors, for some time, as they have long realized that the importance and size of the annual exposition warranted a better home. It is hoped that a new place will be provided by next year.

Hard Steering Result of Inaccurate Manufacture and Assembly

Faulty layout of parts outside of steering gear contributes to common defect in modern cars. Lack of alignment due to inaccurate machine work and improper assembly methods held to account for much of difficulty. Dissatisfied users result.

By E. M. Caskey
Sales Manager, The Lavine Gear Co.

THREE are many differences of opinion as to what constitutes an ideal steering condition. A timid lady driver, we believe, wants an exceedingly easy steering job, and is not so particular about the car holding the road at high speed, whereas, generally speaking, men who are driving a great deal, and especially at high speed, prefer a gear that will enable the car to hold the road well under all conditions. We have found it practically impossible to make a gear that will answer both requirements. In other words, where too easy steering is attained the job does not hold the road as well. This has been found to apply when ball bearings are used on the knuckle pivots. In many such cases it has been found that the car is exceedingly prone to shimmy. We believe the ideal arrangement is one that steers fairly easy, holds the road well and has a uniform feel on the hand wheel under all conditions. One item which makes steering hard, especially at high speed and more or less in turning, is the fact that the tie rod arms do not have the right pitch inward toward the center. These should be so placed that their two center lines produced meet at the center of the rear axle.

HARD steering is attributable largely to friction which arises from a variety of causes. King pins are often fitted too tight or are poorly aligned. The tie rod yoke and pivot axes are not always parallel. The holes in the axle ends are sometimes drilled improperly. The alignment of the axle yokes with the tie rod yokes is a particular job, and with many manufacturers, not half

the attention needed is given. If this assembly is not properly done, an excessive bond develops on extreme turns. In some cases this is so pronounced as to cause a forward jerk and tendency to jump in the steering action.

Excessive friction is found when the drag link is not well oiled or is improperly fitted in the ball joints, or when the drag link is not in proper alignment in either the horizontal or the vertical plane.

Friction is found when the wheels do not have the proper toe in and caster; in fact, friction is very pronounced if these factors are not given due attention.

Hard steering results when front wheels are not castered properly. It also occurs when the drag link is not in proper alignment due to either too long or too short a ball arm on the steering gear, that is, to the axle arm not having a proper length in relation to the length of the ball arm used by the steering gear manufacturer.

Below is a table which has been computed by our engineer:

9 in. knuckle arm to 6 in. steering gear arm turning 36 deg.
moves knuckle through 25 deg.
9 in. knuckle arm to 6½ in. steering gear arm turning 36 deg.
moves knuckle through 26 deg.
9 in. knuckle arm to 7 in. steering gear arm turning 36 deg.
moves knuckle through 28 deg.
8 in. knuckle arm to 6 in. steering gear arm turning 36 deg.
moves knuckle through 27 deg.
8 in. knuckle arm to 6½ in. steering gear arm turning 36 deg.
moves knuckle through 29 deg.
8 in. knuckle arm to 7 in. steering gear arm turning 36 deg.
moves knuckle through 31 deg.

- 7 in. knuckle arm to 6 in. steering gear arm turning 36 deg. moves knuckle through 30½ deg.
- 7 in. knuckle arm to 6½ in. steering gear arm turning 36 deg. moves knuckle through 33½ deg.
- 7 in. knuckle arm to 7 in. steering gear arm turning 36 deg. moves knuckle through 36 deg.

Hard steering can also be caused by the rear springs not being of the proper stiffness. Some manufacturers have gone to a very limber rear springs and set the caster in the front axle when the car is not loaded in the rear. When passengers are in the rear seat the caster is changed to a degree which is detrimental in steering.

Different authorities do not agree as to the proper castering angle or the amount of gather of the front wheels, therefore, we cannot give any iron clad rule to cover these items. Caster and gather come under the same heading. We prefer on the average motor car using our gear that the axle have a caster of not over 2 deg. We are thoroughly convinced that with a ball on the tie arm with a cap on the tie rod similar to that on the drag link is the proper construction as this ball joint would then take care of any irregularity occurring in the arms.

It is impossible to get the caster right with no load on the rear of the chassis and a full load on the front. A happy medium has to be reached in this respect.

MANUFACTURERS of automobiles should watch closely the alignment of the tie rod arms, the toe in and the caster and should see also that the king pins fit properly and have the proper alignment. Many manufacturers do not pay proper attention to the assembly of steering parts. As a result many of the dealers throughout the country have become thoroughly disgusted. In some cases they even threaten to give up their contract before they can obtain assurance that the items referred to will be given the necessary attention.

Much of the hard steering prevailing at the present time is, we believe, an aftermath of the war, as more attention at that time was given to quantity than quality.

The improper attaching of the bracket holding the steering gear to the frame is also a factor in hard steering which is beyond the control of the steering gear manufacturer.

There is generally very little attention paid to the lining up of the steering column. In fact, in many factories

it is a common practice to anchor the steering gear through the lower bracket and to bend the upper bracket to meet the cowl. We believe a large percentage of the hard steering is caused by this careless method of assembly. If assembly foremen do not watch their men they often clamp the attaching bracket tight, using a large wrench. This will cause a bind on the trunnion bearing. All manufacturers should watch these things closely enough to know that, with the front end jacked up so that the wheels do not touch the floor, very little friction occurs when the steering wheel is turned.

WE have seen many cases in which the steering gear worked perfectly freely before mounting, but after it was mounted in the chassis it took a good stiff pull to move the front wheels. The manufacturer should know that there is no use in shipping a car in this condition as it is certain to result in considerable trouble later.

In making a canvass of dealers we find that none of the larger ones permit the cars to go into the customers' hands after they come from the factory until they spend from 12 to 48 hours to get the car loosened up so as to make a proper job of it. This, in the writer's opinion, does not seem right. We believe that the car should be in shape to turn right over to the customer immediately upon leaving the factory.

None of the manufacturers will admit these faults unless they are driven to it by the parts manufacturer. In many cases, they come back at the parts manufacturer by saying that they employ certain methods of construction in their factory and that what they want is a steering gear which will steer their car under any conditions. This is a practically impossible condition to meet. In fact, the general practice of the manufacturer when he receives a unit for test is to turn it over to some driver who has no further interest in the proposition than to make recommendations, which, oftentimes, are made to suit personal opinion without due regard to the conditions under which the part is used. We believe that, in a test on any part, someone who is vitally interested should go over the matter in person after the tester's report is in and personally check up the findings, making certain that the test conditions are fair. We have found in many instances that prejudice enters into the reports which testers make.

High Temperature Causes Excessive Wear of Valve Seats

THE Bureau of Standards was requested recently to investigate the cause of excessive valve seat wear shown in a certain make of engine. These valve seats were in some instances sunk into the cylinder block to a depth of nearly $\frac{1}{4}$ in. In every instance the trouble was found in connection with the exhaust valve seat, but it only occurred in a small number of engines of a given type, and even in the same engine all the exhaust valve seats were not equally affected.

The metal (cast iron) of which the cylinder blocks were constructed was first examined, but this proved to be typical of the material usually employed in cylinder construction, and no difference was noted between the metal of the valve seats showing excessive wear and those showing normal wear. Next it was thought that difficulty might have been encountered in regrinding the valves, some of the valves not being affected by the grinding compound. This would result in the seat being ground away in a vain attempt to get satisfactory tightness. A few experiments were sufficient to eliminate this as a cause.

Attention was next directed to conditions of operation which might account for the trouble. To determine the effect of cam outline and spring pressure, a cam was designed which would give the valve about twice its normal lift and permit it to close very rapidly, thus striking the valve seat with considerable force; but operation with this arrangement failed to show an abnormal rate of wear. However, with valve and seat heated to a dull red color, conditions were changed and the rate of wear was amply rapid to explain the trouble.

It should be mentioned in this connection that a reducing flame was used in these experiments to avoid any possibility of rapid wear through oxidation of the metal. The temperatures reached in this experiment might result in actual operation from preignition or a very slow burning mixture, and it is probable that one of these conditions coupled with inadequate cooling of the valve seats was responsible for the abnormal wear in the engines under investigation. The results of these tests are of interest to all automotive engineers.

“Just Among Ourselves”

Show Time Advertising Copy Can Be Improved

WITH the show season only a few weeks away, it is none too early for automotive advertising managers to give a little thought to the copy they will use, especially during the New York and Chicago shows. There is plenty of room for improvement over that used last year. The copy supplied the metropolitan papers was devoted pretty generally to what one hard-boiled but thoroughly seasoned advertising man characterized as “extravagant claims and circus statements, superlatives and pretty phrases.” There wasn’t much meat except the prices and price was played up in the biggest type the space used would carry. American automobiles are good automobiles and even if every company does admit its product is the best it should be willing to present a few proofs without expecting the public to take its word for it.

Freight Traffic Congestion Hits Industry Hard

WE stated in AUTOMOTIVE INDUSTRIES of July 20 that “within the next three months it is practically certain there will be almost unprecedented freight congestion on the railroads.” The traffic jam which was forecast then now has reached acute proportions. So long as business goes on at the present pace, the traffic jam will continue and even if there were to be a sharp decline in the volume of merchandise offered the carriers in the mid-winter months it would not offset the added difficulties which will result from snow, sleet and cold. No railroad can approach in winter its summer efficiency. This freight congestion will become increasingly serious for the automotive

industry as it becomes more difficult to continue driveaways. In fact, it is even now practically impossible to make deliveries to the Pacific Coast and other sections far removed from the factories.

Really Constructive Publicity Would Aid Industry

ONE thing from which the industry is suffering is a lack of constructive publicity. Individual factories are getting a good deal of it, of one kind and another, but it is not calculated to aid the industry as a whole. A good deal of it might better be left unprinted. No well-planned and concerted effort ever has been made to present to the people of the country the automotive side of various national problems, such as highways, taxation, regulation, safety, fuel and research. A couple of the trade organizations have done some excellent work, but there has been nothing of an all-industry character.

There are some organizations, committees and boards doing research work from which it is practically impossible to extract information about what they have accomplished or are trying to accomplish. And yet these organizations are dependent upon contributions from trade associations or individuals for their support. Such support would be given much more gladly if they were willing to let the world know they are doing something worth while.

Impending Cotton Shortage Will Hit Tire Makers

CONSIDERABLE concern is being shown, and with reason, by the tire industry over the probability of much higher prices for cotton fabric before another crop is harvested. Persons thoroughly conversant with the situa-

tion assert that a serious cotton shortage is likely in the near future and such a condition inevitably would force prices up. With steadily rising crude rubber prices and a scheme worked out in Great Britain to restrict output, it is difficult to see how American tire manufacturers can escape higher prices to the public. Tires cost less now than they ever did, but standards of quality have not been maintained universally. It may be that higher prices will help to eliminate some of the evil practices which have grown up in the industry. If such is the case they will not be an unmixed evil.

Little Defects Often Serious for Dealer

A GOOD many passenger car manufacturers are inclined to scoff, on general principles, at the suggestions made by their dealers and distributors. Obviously, not all these suggestions are good, but some of them are. A big distributor in Cleveland makes one which has a lot of meat in it.

He contends that manufacturers don’t realize, as they should, that every time a family buys its first car it marks an epoch in the history of that family, especially for the feminine members of it. They don’t know much about machinery, but they love their car. They polish it tenderly and scrub it as gently as they would their most cherished piece of furniture. When they find a defect in the painting or a spot of grease on the upholstery it means more to them than a knock in the engine.

This dealer contends that when companies are striving for big production they are inclined to slight inspection. If the inspectors are holding up the assembly line they are likely to get a jolt

More or Less Pertinent Comment on Topics of Current Interest to Men in the Industry.

and be told not to be quite so fussy. If they slacken their vigilance, however, it may mean disgruntled buyers and endless trouble for the dealer. In the long run, a multiplicity of little things count as much as a few big ones.

New York Police in Despair Over Traffic Problem

POLOICE COMMISSIONER ENRIGHT says the New York police are at the end of their rope "as regards traffic control under present conditions." He recommends the razing of the Sixth and Second Avenue elevated structures to provide lateral thoroughfares which would carry heavier traffic as well as the construction of an elevated roadway or viaduct from the Battery to Fifty-ninth Street as another measure of relief. This statement, coming from such a source, gives emphasis to what every one has been saying about the terrific traffic congestion in New York. Similar conditions prevail in every large center of population.

The traffic problem undoubtedly is retarding sales and it is one to which the entire automotive industry should give careful, constructive thought.

Finding New Markets for Parts

SOME parts makers with surplus factory space are cutting down overhead by developing new fields for their products where it can be done without the installation of expensive new machinery. We know of one, who makes bearings, who has gone into the industrial field and is getting a good many orders, most of them small, from industries other than the automotive.

Another company which makes tubing has found a profitable market in the bedstead manufacturing field. Exactly the same

sizes can be used and it has not been necessary to put in any new equipment. Sales effort along this line has not been expensive. Much of it has been by mail.

There are comparatively few companies which could not do a little more in this direction. It would help mightily in a time of depression.

Consolidation of Sales Efforts Considered

AGOOD many parts makers are becoming convinced that the time is not far distant when they will have to consolidate sales organizations and sales efforts to hold down costs and get the widest possible distribution. Some progress already has been made in this direction and more is in prospect. Actual consolidations of companies are not so probable as sales and service alliances. Such a system might result in a smaller margin of profit on each unit, but it would increase the number of units sold and thereby maintain the volume of profits.

Trade Names of Standing Not Likely to Perish

CREDIT men representing parts manufacturers are giving thoughtful consideration to the possibility that some of the smaller vehicle companies may not be able to stand the strain of competition in 1923, but most of them believe that trade names will be extinguished slowly and that a great many different makes of cars and trucks always will be manufactured even though a comparatively few companies get the lion's share of business. Some companies in financial difficulties are turning out products of sterling worth and these names probably will be preserved, although the companies making them may be reorganized. So far

as units, accessories and equipment are concerned, many new devices will be marketed every year.

Contract Cancellation Evil To Be Surveyed

UNtil business got back on its feet, the automotive industry, in common with every other line of trade, was suffering from the indiscriminate cancellation of contracts. It is interesting to note that a group of farsighted financiers and business men is giving serious consideration to means by which the evil can be reduced when hard times come again. Plans are under way for a searching analysis which is expected to disclose constructive remedies. It involves a business as well as a moral problem of primary importance. Trade cannot proceed confidently unless faith can be placed in the sanctity of contracts.

Elimination of Waste Will Keep Prices Down

IN an era when competition is as keen as it is at present, one of the aims of every manufacturer must be to eliminate every waste and give the public the benefit of every saving by offering the lowest prices consistent with legitimate profits. The margin of profit in the various stages of distribution must be watched carefully so that the ultimate expense to the user will not be out of all proportion to the production cost. There is an intimate relationship between the costs of manufacturing and of production. This applies with special force to replacement parts. Car owners must be satisfied and satisfaction is impossible when they are convinced, as many of them are to-day, that they are being "gypped" every time repairs or replacements are required. J. D.

An Executive View of Automotive Electric Standardization

Business men of automotive industry have not given adequate support to creation and use of standards. Needless variations in detail result in higher costs and many service complications. Cradle or foot-mounted generator with separate stub shaft favored.

By G. B. Griffin

Manager, Automotive Equipment Department, Westinghouse Electric and Mfg. Co.

IT has been the object of some years of effort on the part of electrical manufacturers of automotive equipment, operating with certain designing engineers as joint committeees of the A. E. A. and S. A. E., to bring about standardization to a degree beyond what heretofore seemed possible. It has always seemed to the writer that the executive and commercial branches of the automotive organizations have not given this movement the whole-hearted support and determined backing that it should have, as in reality the attempt to standardize, if measured by results that should be had, is of greater moment and benefit to the commercial organizations and manufacturers of automotive equipment than it is to the engineering branch of the industry.

Electrical standardization possibly was not of such prime importance in years prior to 1914, as the number of electrically equipped cars in the field were extremely low as compared with those now in service. I think it is entirely probable that there are 9,000,000 electrically equipped vehicles in the United States. It is obvious, therefore, that the prompt servicing of these electrical equipments is of great importance.

Electrical equipment manufacturers have for many years past put forth individual and joint efforts to build up and maintain service departments and agencies in hundreds of cities throughout the country and in many foreign cities as well. The obstacle in the way of still further increasing the number of these stations lies in the direction of complexity and therefore the cost of the proper renewal parts stock that should be carried to give service of value to the manufacturers, dealers and users. A difficulty which is enhanced in the securing of these agencies is the fact that men who have the necessary detailed electrical knowledge, and of the general mechanics and theory of the gasoline explosion engine and who have adequate financial responsibility to take on and carry out this important electrical service, are few in number.

IN solicitation of this class of field representation, one is immediately impressed with the bewildering minor variations in details of electrical structures made necessary by the idiosyncrasy of design of the engines by the vehicle manufacturers or suppliers.

The aforementioned variables are seemingly of little importance, and to the vehicle manufacturers' represen-

tatives are not variations from other structures sufficient to raise objection to their being supplied. These matters are such details as the variation in the length of the armature shaft, the location of the coupling pin hole in relation to the shaft end, variations in tapers of the shaft, various keyways, various size and types of threaded nuts on the shaft ends. But, since the structure of an armature begins with its shaft, it is plain to be seen that each one of these mentioned variations—and there are several more—means that the manufacturer and service agent in the field must carry an armature to meet each one of these variations.

Again there are variations in the methods of mounting or bolting on the generator and motor to the engine structure. We have to contend with cradle mountings, foot, or bracket mountings, flange mountings and sleeve mountings with variables in each and every one of these various types.

In addition to these, we have the so-called inboard and outboard bracket fittings for starting motors with all sorts of variables in the distances between the flange faces and the shaft ends.

WHILE we have accepted the S. A. E. and A. E. A. standards for flange and sleeve mountings, it seems sometimes that the vehicle designing engineer will go out of his way to make a variation in the location of the flange, the position and size of bolt holes and other like variations, but investigation shows, in many cases, that the manufacturing organization is equally at fault. A little more forethought and study would have made some one of the standards entirely satisfactory for the installation.

The point that the writer wishes to make is that it is costing the industry directly or indirectly a very large sum of money each year to supply and service such a wide range of variables. This is economically wrong. Further, it hinders prompt and efficient field service by limiting the number of points at which stocks can be carried.

The statement is frequently made that "a vehicle producer purchasing 10,000 equipments a year has the right to set up his own standards to which the supplier should not object." This is true only provided that the purchaser is willing to assume the additional cost burden either direct or through the ultimate users that servicing a product with special dimensional details always entails.

The A. E. A. committees co-operating with the electrical committees of the S. A. E. should be able to bring about better general conditions by agreement, but the agreement, if arrived at, will not necessarily mean the adoption of the proposed standards unless the executive officers of the vehicle manufacturer and his suppliers insist that engine designs shall be laid out so that standards only shall be used. The proposed standards that have been published from the results of the operation of the A. E. A. committee seem to hold within them possibilities of success so far as the engineering of the devices is concerned. The next problem is the adoption, not by the engineering associations only, but by everyone connected with the industry.

IN the writer's opinion, the committee has put forth in its suggestions a greater number of frame sizes than is desirable and it is possible that some of the intermediate sizes can later be dropped out and a considerably larger size added than is now contemplated to take care of especially large lighting loads, such as overland highway buses, double deck street buses and the like. Also, the number of proposed standards should, if possible, be reduced.

I have always felt that the most desirable application in the electrical generator unit is the double extended shaft, cradle or foot mounted machine, coupled to an independent stub shaft connected to the driving mechanism of the engine and supported upon its own bearings. The difficulty is in securing a satisfactory small flexible coupling and, in addition, making accurate within the limits of commercial practice the alignment between the driving stub shaft and generator shaft. The flange mountings, barrel or sleeve mountings are, in the writer's opinion, a delusion when considered as a saving and convenient for the industry to use. If a coupled generator of the type referred to was used the terrific stock of flanges, armatures, brackets, etc., now having to be carried in the service departments and field service stations would be entirely done away with to the benefit of all concerned. I also maintain that, in the end, the engine would be just as cheap to construct and much easier to renew the electrical equipment upon.

As an example, one of the present-day popular passenger car engines has a generator with a flange mounting and a gear, mounted on the generator shaft and meshing into a drive chain on the front end gear case of the engine. This generator has shaft extension on the opposite end which carries a tumble shaft driving pump through flexible couplings on each end of the tumble shaft. In taking off this generator for any purpose, a considerable amount of unnecessary work has to be done. Anyone who attempts it will be aggravated to find that, to avoid taking off the radiator and gear case cover, it is necessary to wire up the drive chain so that, when the generator gear is removed, the chain will not fall down into the gear case and make a partial dismantling of

the engine necessary to readjust it. This wiring up, again mounting the generator in its proper position, getting the chain into mesh and withdrawing the wires inevitably takes a great deal of time and the service station operator receives complaint for the amount of the charge made for the repair. This time would be cut down 70 per cent in most cases if a foot or cradle-mounted generator had been used with stub shaft drive as suggested in preceding paragraph.

It is the continued reaching of the industry for the paring off of the last cent that has brought about service complications. It is the writer's belief that the time has come in the industry when an attempt should be made to provide a vehicle that has the maximum amount of accessibility for repairs and replacement of parts rather than continued attempts to save the initial cent at the sacrifice of the ultimate dollar in upkeep.

I am highly pleased to see some of the thinking men of the industry giving attention to these matters and have noted the suggestions of Col. J. G. Vincent, who has done much for the industry in giving support and assistance to the adoption of many useful standards. I will not here undertake to discuss all of the points mentioned by Vincent, most of which are very pertinent, but in regard to that referring to the ten-tooth motor versus twelve-tooth motor of like stalled torque rating, I would say that, on account of the demand for cranking speed rather than high stalled torque, or in other cases the reverse of these demands due to variation in engine design and operation it is difficult to come down to the one motor and change the number of gear teeth as Vincent suggests. Still my

Somebody Pays for Non-Standard Details

SOMEBODY always pays the cost of unnecessarily diversified details in design. A manufacturer who builds 10,000 cars a year may create his own "standards" if he desires, but in so doing he complicates service problems and makes it necessary for hundreds of service stations to carry special parts for which someone must pay.

To the electrical equipment maker it sometimes seems that the engine designer goes out of his way to make a minor variation in flange location, size and position of bolts, etc., but investigation has shown that the manufacturing branch of the organization is often equally at fault.

These are some of the significant points brought out in this article by an executive connected with a prominent electrical equipment manufacturer.

heart is with him in this suggestion, and it would appear that some happy medium could be agreed upon and obtain both satisfactory cranking speed and stalled torque ratings from the same motor.

IN connection with George A. Green's letter pointing out the necessity of larger machines, I agree that there is some necessity in cases such as he points out and which I have already mentioned. In regard to a device to prevent overcharging of the battery, the company which I represent has developed the voltage regulator system which positively will do this.

I am glad to see AUTOMOTIVE INDUSTRIES giving support and assistance in this movement and hope it will keep up the good work and continue to give space in the "Forum" to the matters under discussion.

ATOTAL of 87 concerns were engaged in the manufacture of aluminum during 1921, and manufactured \$45,822,000 worth of that product. Compared with 1919 the total value of the aluminum manufacturer's product was \$75,273,000, representing a decrease for 1921 of 39.1 per cent in the value, according to census figures on the aluminum industry, which have recently been made public.

New Multi-Spindle Chucking Machine for Automatic Production

Many car and truck parts can be handled on six-spindle model designed by Baird Machine Co. Adapted to pieces up to 6 in. in diameter and 6 in. in length. Equipped with 8 tool slides.

By P. M. Heldt

AUTOMOTIVE production men have recently been taking a new view of their machine tool problems. They are beginning to look at the machine tool entirely in its relation to unit production cost. Some of them have decided that the time saved by a special piece machine does not always make for efficiency when overhead and repair costs are considered. More attention is being given to tools that can be adapted to several purposes as production needs require.

Tool builders are recognizing these new demands from the automotive field. An interesting example of this trend in the direction of a multi-purpose tool, specially adapted to quantity production work, is given in the new six-spindle automatic chucking machine, recently announced by the Baird Machine Co. This machine will handle parts up to 6 in. in diameter and 6 in. in length and, having six spindles and eight tool slides, is specially adapted to the machining of parts requiring a multiplicity of operations.

The machine has a turret carrying all of the six spindles, which are arranged in a circle concentric with its main axis. When in operation, five of the spindles revolve around their respective axes, while the sixth, which is said to be in the loading position, is stationary. Two of the spindles are vertically above and below the main

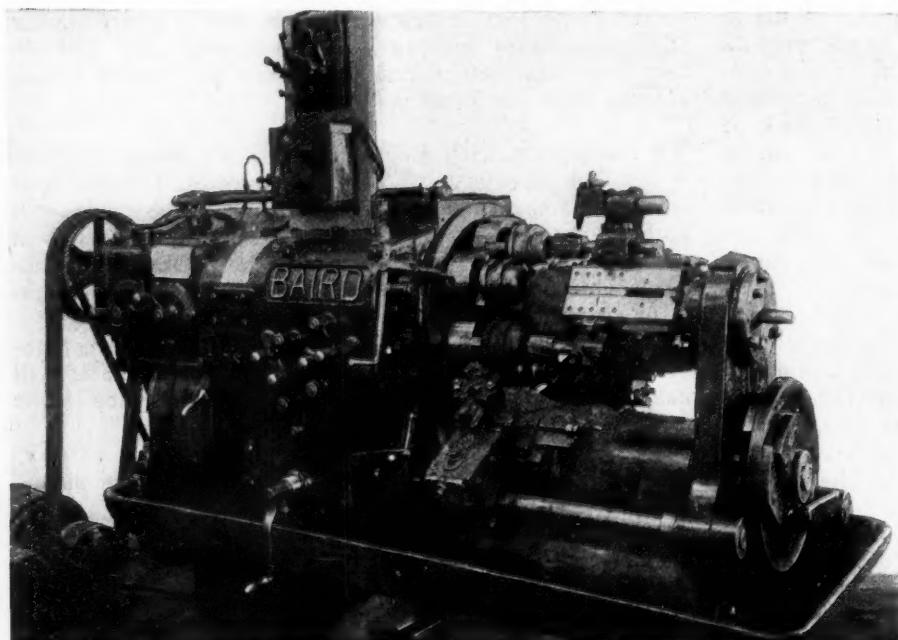
axis of the machine, respectively, and the loading spindle is the one next to the topmost toward the operator. All of the working spindles rotate in the same direction, namely, left-handedly when looked at from the right hand end of the machine.

Method of Operation

Directly below the loading position is the first working position. It will be understood that each of the five working spindles carries a piece of work in its chuck and all of these pieces are being operated upon simultaneously, while from the chuck in the loading position the finished part is removed and a new blank inserted. Special chucks or fixtures will probably be used in most cases, to suit the shape of the part worked upon. The turret is indexed by means of a Geneva motion which rotates it through an arc of 60 deg. It is locked securely in the working position by means of a cam actuated finger which engages slots in its periphery. In the first working position the part can be operated upon by tools carried by two tool slides, one of which has a radial (cross feed) and the other an axial (longitudinal feed) motion. Each of these tool slides can carry one or more tools.

All feeds are automatic. The radial feed is controlled by the inner cam on the cam plate on the right hand end of the machine, whereas the longitudinal feed is controlled either by a pull rod extending through the axis of the machine or by a sleeve surrounding same. These two feed rods derive their motion from cams on a cam drum at the left-hand end of the machine. The rod has a range of motion materially greater than the sleeve, and each of the longitudinal feed tool slides can be operated from either the rod or the sleeve, according to the length of cut the tools carried by it are required to take. The cam drum, in addition to the feed cams, carries quick return cams by means of which the tool slides are quickly brought back to the starting position after the cut is completed. The pull rod and pull sleeve are provided with a six-armed spider, the arms having slots in their outer ends into which may engage lugs carried by the tool slides.

While the work is in the position be-

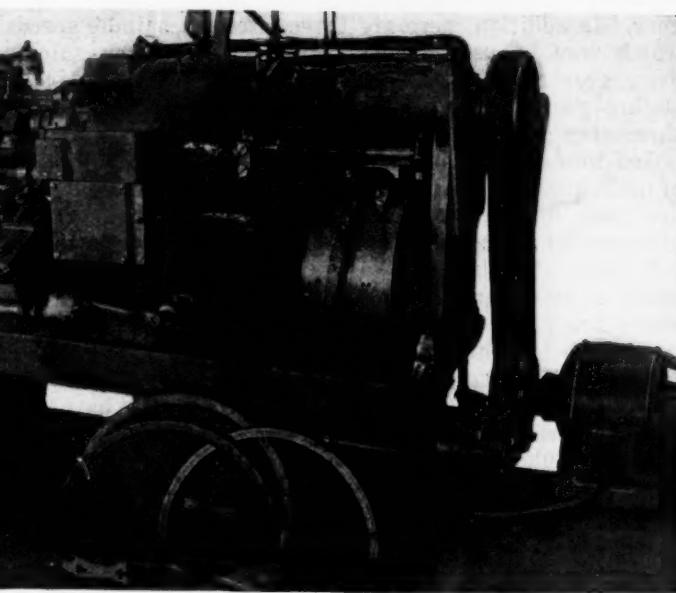


Operating side of Baird multi-spindle chucking machine

low the axis of the turret (the second working position) it can be operated on only by tools having longitudinal feed. In the third working position there is again both a cross feed and a longitudinal feed, the same as in the first position, with the difference that here the tools in the radial feed slide are reversed in position, being at the back of the work instead of in front of it, and, therefore, having their cutting edges turned down. In normal operation the tools in this position are most likely to be used for finishing operations, while those in the first position are used for roughing cuts. The cross or radial feed slide of this position is controlled by the outside cam on the cam plate. For working positions Nos. 4 and 5 the tools have only longitudinal feed, with a choice of two ranges of motion.

The machine is controlled by means of a horizontal lever convenient to the operator's left hand. This lever, which controls the feed drum drive shaft clutch, can be held in the working position by means of a latch. The machine will then function continuously. With the latch disengaged the machine will complete its functions in proper sequence but once, the driving clutch being automatically thrown out. If the disengagement takes place while a cut is in progress, the cut will be completed and the tool slides return to the points at which their strokes begin and will remain there. The spindles will keep on revolving but will not index. This feature is of value if the operator attends to a number of machines and in consequence may not be able to load and unload a chuck in the interval between indexing motions.

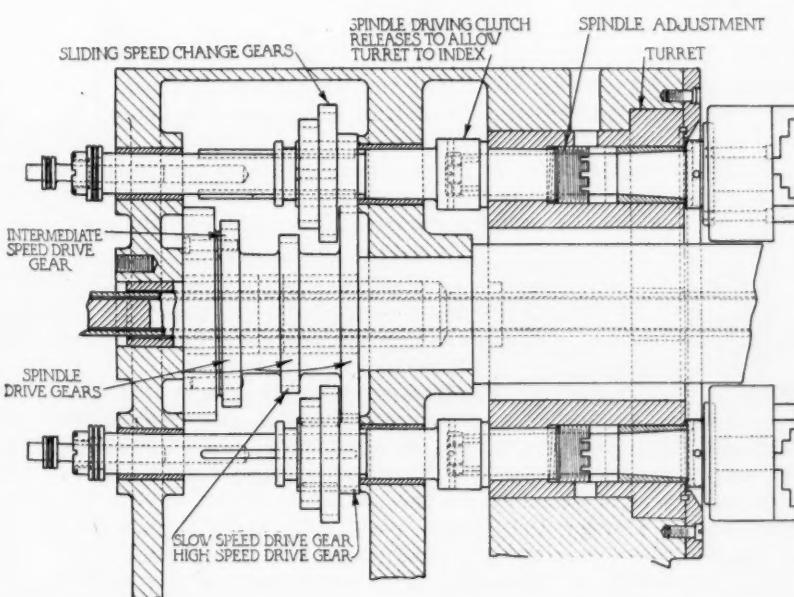
An interesting feature of the machine is the wide range of cam drum speeds obtainable. This cam drum or feed drum has 15 different speeds, ranging, for a driving pulley speed of 800 r.p.m., from $1\frac{1}{4}$ r.p.m. to $2\frac{2}{5}$ r.p.m. which is at the rate of one revolution in 14 minutes or one revolution in 25 seconds respectively, the latter speed being thrown in automatically for quick indexing of the



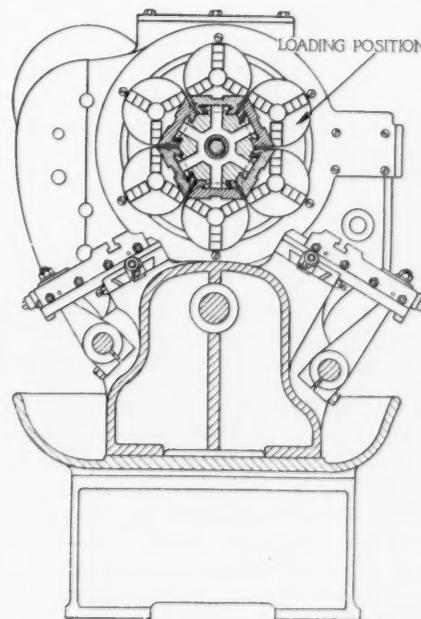
Rear view of machine. Note feed drum with cams on right

turret. It will be understood that the time required for one revolution of the feed drum is the time required to finish one piece, hence the capacity of the machine ranges from $2\frac{2}{5}$ pieces per minute to one piece in $5\frac{1}{6}$ of 14 minutes plus $1\frac{1}{6}$ of 25 seconds, or $11\frac{3}{4}$ minutes, approximately, at 800 r.p.m. of the driving pulley. Still greater capacity than the maximum quoted could be obtained by speeding up the drive. The feed changes are made by means of four levers at the front of the machine; each position of each lever is marked by a letter cast on the frame, and a chart is furnished with the machine which tells the set-up man what combination to use for any given rate of feed. The feed drum is driven by a pinion meshing with an internal gear cut integral with the drum and the changes of speed are obtained through heat-treated steel gears which are fully inclosed and flooded with lubricant.

A large range in spindle speeds is also provided. The two levers on the front side at the left hand end, together with the horizontal lever directly above them, permit of changes in the speed of a central three-step spindle drive



Vertical longitudinal section showing spindles and change gears



Cross section showing cross feed tool slides

gear. In addition there are three different spindle speeds which may be used in connection with a given spindle drive gear speed. On each spindle there is a three-step sliding gear that is adapted to engage with the central three step spindle drive gear. The sliding gears can be pulled into any of the three positions of mesh by means of pull knobs at the left hand end of the machine and are held in the working positions by spring pressed plungers whose rounded points engage in grooves on the pull rods. The spindle speeds obtainable with a drum speed of 800 r.p.m. range from 28.5 r.p.m. to 440 r.p.m. There are eight different spindle drive gear speeds and these with the three changes of speed for the individual spindles give a range of 24 speeds for each spindle. In operation all of the five working spindles may have any one of three different speeds in the range corresponding to a particular lever and pull knob setting. A chart is furnished with the machine for use of the set-up man similar to the chart mentioned for feed changes.

The crank handle seen at the front near the bottom

serves to turn the machine by hand for tool setting. Its shaft extends clear through the machine and the crank can be applied at either side. The frame is mounted upon a pan underneath which are two reservoirs, one for lubricating oil and the other for cutting compound. The pan catches the cutting compound, which is not allowed to come into contact with the oil. Rotary pumps for circulating lubricant and cutting fluid are arranged at the left hand end and are driven by belt. Lubricant is positively fed to all bearings and the change gearing through copper tubes.

Electric drive is provided for, a 5 hp. motor being required, which can be placed either on the floor or above the machine, the drive being by belt. The motor also may be mounted on top of the machine and the drive made direct through gears or silent chain. The starting rheostat and circuit breaker are mounted on a panel on top of the machine handy to the operator.

There are undoubtedly many automobile parts that can be handled to advantage on a machine of this kind.

The Effect of Heat Treatment on Cast Iron

IT is now very common to apply some form of heat treatment to steel used in machinery construction, and of all of the steel that goes into the manufacture of automobiles there is very little that does not receive some such treatment. On the other hand, very little seems to be done by the way of heat treating cast iron. There is, however, a certain amount of research work available that permits of fairly accurately predicting the effect of a certain heat treatment on the physical properties of cast iron. Some work along this line was done in France by Charpy and Grenet, and recently a note on the subject was presented to the French Academy of Sciences by Jean Durand. Charpy and Grenet consider cast iron to be constituted of a mixture of steel and graphite. If this theory is accepted it follows that the mechanical characteristics of cast iron are affected by the physio-chemical state of the steel as well as by the distribution of the graphite, the latter being in the form of inclusions.

So far only the effect of annealing on cast iron has been investigated to any extent. In Durand's note are given the results of some tests relating to the change in the mechanical qualities of the cast iron due to annealing. These tests were made on cast irons of the following compositions:

Total C	Graphite	Silicon	Manganese	Sulphur	Phosphorus
A 3.200	2.720	1.180	0.536	0.048	0.208
B 3.250	2.500	1.087	0.432	0.056	0.131
C 2.960	2.400	0.823	0.840	0.048	0.149
D 3.060	2.740	1.195	0.504	0.041	0.257

In order to be able to compare the results of the heat treatment with those obtained in regular practice, the tests, and particularly the shock tests, were carried out according to technical specifications of the French railroads, notwithstanding the fact that these methods do not furnish numerical results capable of easy interpretation and that the shock test in particular involves the measurement of an amount of energy under conditions which reduce the accuracy the greater the magnitude to be measured. The tension test pieces, in series of 12 for each composition, were poured in sand to a diameter of

1 in., after treatment machined to $\frac{5}{8}$ in. and normalized. The test was made in a Maillard machine.

The shock test specimens were cast in sand, 1 9/16 by 1 9/16 by 10 in. in dimensions. The bar was placed between two knife edges 6 1/4 in. apart. A tup weighing 26.5 lbs. was dropped from an initial height of 11.5 ft., the height being increased 2 in. at a time until the test piece was broken.

The annealing process adopted consisted in heating to 1650 deg. F. for 45 minutes in an electric muffle, cooling right in the furnace. The results of mechanical tests before and after the treatment are summarized:

	Average Tensile Strength, lbs. per sq. in.		Height of Drop, in.	Average of Shock Test, lb.-ft.	
	Before	After		Before	After
A	32,800	23,000	26	24	303 247
B	36,100	22,500	22	24	195 247
C	29,000	23,300	22	20	195 147
D	36,100	22,800	26	24	303 247

It will be seen that the resistance to shock is greatly affected by the annealing although the height of drop breaking the specimen was not changed much. The reduction of the resistance to shock is due to the separation of graphite in the annealing process, as is brought out by the chemical analysis, the results as follows:

	Graphite Content				
	Before	After	Before	After	
A	2.720	2.920	C	2.400	2.520
B	2.500	3.000	D	2.740	3.050

GLASS manufacturing concerns in the United States, numbering 328, during 1921, employed 59,705 persons, and produced \$212,593,000 worth of manufactured products, according to census report on the glass industry just made public by the Department of Commerce.

During 1919 there were 371 concerns manufacturing glass, employing 83,656 people and produced \$261,884,000 worth of products. The percentage of decrease in the value of their product in 1921 was 18.8 per cent while the number of concerns engaged in the industry was reduced 11.6 per cent.

Getting Better District Managers

Part II.

Obstacles to training must be overcome. Not enough good men have been born; some must be made. Payment is usually on straight salary basis, but sales managers seek suitable bonus system. Specialized traveling men are future possibility.

By Norman G. Shidle

THE functions of the traveling man have been outlined in a general way. More detailed and specific definition of the job is necessary. Only in a few instances have there been any actual definition and outline of what the district manager is expected to do. Frequently, the factory sales manager, in the past, has taken on district managers and sent them into the field without adequate knowledge of just what was expected of them. It is not enough to tell a man that he has "general supervision" of his territory.

A detailed, written job analysis of the position of district manager should be available in every factory for the use and instruction of district managers. One big company has just made such an analysis, after operating for years on "general principles," and is already finding that job analysis very valuable. Besides being necessary for the district manager, such an analysis serves to clarify in the mind of the factory sales manager just what he does expect in the work of his territorial representatives.

Increased dissatisfaction with the work of the average district manager has led most factory sales managers to the conclusion that training of some kind will be necessary in the future. Little has actually been done along this line.

The point seems to have been reached where everybody thinks training is necessary, but no one has yet studied the problem enough in detail to actually map out and put into operation any practical plans.

IT is customary to keep a new district manager at the factory for several weeks before sending him out into a territory. Usually these factory weeks are devoted chiefly to making him familiar with the various policies of the company, getting him acquainted with the manu-

facturing organization and methods, and permitting him to become thoroughly familiar with the product itself.

SUCH information, of course, forms a necessary part of any training plan. It does not form, however, a complete education for a branch manager. Granting what experience has proved—namely, that few men can be obtained who are expert enough on all sides of the work—it appears to be necessary in the future to provide some training which will round out the knowledge of the new man.

Suppose the new manager has had his experience almost entirely on the sales firing line. He is probably a bit hazy about finance, accounting and other administrative work, concerning which he will be expected to help distributors and dealers. Some manufacturers think that such a man could be put through a brief training course which would give him a foundation of principles along these other lines. Upon these principles he could build further knowledge by later experience.

The great lack of good men for district manager positions makes some such scheme almost a necessity. It is useless to point out the many difficulties that lie in the way of working out a practical and workable training plan.

Efficient men are needed and a way must be found to get them. Whatever the difficulties, some of them can certainly be overcome. Progress can be made and conditions can be materially improved. It is not practicable to refrain from trying to perfect a plan, simply because there are obvious limitations to the possibilities in training.

Only one or two men, usually, are taken on by a company at any one time. This makes training almost an individual matter, and causes some important difficulties.

THIS second article completes the discussion about district sales managers.

The purposes of these two articles have been to summarize the existing problems, to bring together a digest of what various sales managers are doing to better conditions, and to promote the further exchange of ideas on this important subject.

Last week the general functions of the district manager were outlined, as viewed by representative sales managers, and details of operating practice were given.

This article tells what some prominent executives are thinking about training men for district managerships and points out possible and probable future trends. We will be glad to have further comments from the industry.

One sales manager says, for example, "If I were going to put on fifteen or twenty men, I would be in favor of a training school at once."

An individual training system is possible, however, and present methods could certainly be improved without installing any expensive systems. Another alternative might be some sort of co-operative training course, in which the district managers of various companies could participate. This course might deal with the fundamentals of the district manager's position and functions. To this could be added the training in individual company policies which is now commonly given.

It is impossible to turn out seasoned district managers from an intensive training course of a few weeks. No sensible man would propose or expect such a thing. It would seem possible to improve present training methods, however, to the extent of rounding out the picture of duties and methods for the new district manager—or for the old ones for that matter—in a more specific and detail way. Certain companies already have some definite plans under consideration.

MOST district managers are working on straight salaries at the present time. Certain forms of bonus have been used, but are not common among the more important companies. The bonus systems thus far tried have involved chiefly a bonus per car. Such a method of payment obviously offers many disadvantages, as well as advantages. A bonus per car is likely to make the district manager think too much of getting rid of cars immediately, and too little of making dealers better merchants.

Most experienced sales managers, however, favor a bonus system of some kind and have refrained from installing one chiefly because they have not yet been able to work out a method that will be satisfactory from every point of view.

More and more specialized knowledge is becoming necessary in the merchandising field. District managers are being called upon for a greater detailed knowledge of widely different phases of business. This trend is on the increase rather than on the decrease. Practically all the important factory sales managers are in agreement on this point. Practical speculations will have to be made soon as to what changes in factory territorial rep-

resentation will be necessary to take care of these new conditions.

A larger number of efficient district managers probably will be necessary. They are likely to cover smaller territories with more intensive effort and attention. This seems almost inevitable.

Another line of possible development suggests itself, however, which is more nearly in the realm of pure speculation so far as actual present intentions are concerned.

Perhaps factory traveling representatives will be developed along special function lines, instead of being assigned to geographical territories as at present. Perhaps it will be worth while to consider the development of a service specialist, a sales specialist, a financial specialist, etc., each of whom will go about giving practical aid to distributors and dealers in connection with problems arising in his special field. These men might cover large territories, each one visiting a given distributor less frequently; some one of them, however, visiting each distributor about once a month, as do the district managers at present.

Special factory service men have traveled about for a number of years. These special service men have not been just the type of special representative described above, as they have been almost entirely concerned with mechanical problems of service. Their presence, however, indicates that in one division of a specialized field, special representatives have been necessary.

The suggestion of one big company that it may send out special financial representatives from the factory to help put dealers on a better financial basis is another straw pointing in the direction of specialized representation.

THREE are not enough examples of this tendency to indicate a trend. The idea is simply mentioned here as a speculative possibility. If such a development should begin, however, it should be planned and worked out; not allowed to "just grow." Specialized representatives in any appreciable numbers cannot be added to district managers, as the aim of all efforts toward improvement must be to definitely decrease, rather than increase even slightly, unit marketing costs. Every new plan must be judged on a unit cost basis.

Aircraft Warning Signal

DETAILS of an invention by the Bureau of Standards that will warn flyers and balloonists of their rising or falling, have been made public by the bureau, which has been at work on the problem for many months.

A sylphon chamber is provided which can expand or contract a great deal with a very slight change of air pressure. Its motion is magnified until a change of altitude of 30 ft. is plainly visible, no matter how slowly it may occur. This chamber is normally closed to the atmosphere, and thus records the difference between the pressure outside and the pressure at which it was last opened. When it reaches the limit of its motion in either direction (i.e., up or down) an electric contact is closed, and a valve is opened connecting the chamber to the atmosphere and restoring it to zero.

The pointer moves to the right or left, its rate of motion depending on the speed of rise or fall, and when it reaches the end of its motion it jumps back to zero and starts again.

Such an instrument will be of value to balloonists, who have heretofore had to depend on barometers and other means of measuring altitude, none of which were sensitive enough. Use of the instrument will tend to save a great deal of gas, due to the fact that in ballooning the pilot discovers the fact that he has gone a considerable distance up or down, only after he has attained a high degree of velocity of ascent or descent. It is then necessary to let out a lot of gas or throw over a lot of ballast in order to stop the motion, whereas, if it had been discovered sooner less gas or ballast would have been required.

Moderate vs. High Speed Passenger Car Engines

Ricardo and Strickland debate relative merits at meeting of Institution of Automobile Engineers. Better fuel economy in high speed type, Ricardo says, but his opponent thinks this is offset by disadvantages, such as increased bearing pressures.

UP to the present time the development in automotive engines, and particularly passenger car engines, has been steadily in the direction of higher operating speeds. About 1905, when the old A. L. A. M. horsepower rating formula was adopted, piston speeds of stock engines ranged around 100 ft. p. m. The movement toward higher speeds was led by designers of racing engines. At a comparatively early date the cylinder bore of racing engines was restricted by competition rules, while later the piston displacement was limited instead. Under these circumstances designers sought to increase engine output by increasing the speed. In those days the racing chassis of one season was frequently the stock model of the next, and it is therefore not to be wondered at that the piston speeds of stock cars increased in conformity with those of racing engines, though they naturally always lagged behind to quite an extent. According to a chart of French origin, the average piston speed of stock car engines increased comparatively uniformly from 800 ft. p.m. in 1902 to 1300 ft. in 1912 and then at a more rapid rate to 1800 ft. in 1914.

At first the object in going to higher piston speeds in touring-car engines was to increase the ability of the cars, and to thus obtain machines that were more responsive to the throttle. This latter factor, of course, is entirely a matter of engine output in proportion to total weight to be moved, and to-day practically any degree of "liveliness" desired can be obtained with what has come to be known as a moderate speed engine. Hence the desire for a more lively car is hardly any longer a legitimate reason for increasing engine speeds.

TONDAY designers of cars in Europe, where the high speed engine has probably attained its highest development, have to bear constantly in mind two conditions with which car users are confronted. One is that fuel prices in all European countries are unprecedentedly high, which makes fuel economy an important desideratum; the other that high annual taxes are levied on passenger cars abroad, and these taxes are always based either on the cylinder bore or on the piston displacement, hence it is desirable to make the bore or the displacement of the engine as small as possible, consistent with the work which the car is expected to do.

Recently high speeds of revolution have been employed, especially in light car and cycle car engines manufactured abroad, which in many cases have piston displacements commensurate with those used on the larger sizes of motor cycles here. The chief advantage of these engines is that they are economical as regards fuel consumption, and inasmuch as the cost of these

small machines is less than that of full sized, more liberally powered cars, they have been meeting with considerable favor in those countries where after-war conditions compel economy in expenditures.

On the other hand, from the standpoint of operating convenience, these engines are not nearly as satisfactory as those more liberally dimensioned in respect to the weight of the car and load, and operating at more moderate speeds. In England there has recently been an outcry against the method there used for determining the tax on cars, which fosters the development of engines of small bore and high angular speed, a type of engine that is not wanted by purchasers in the colonies, it is said.

THE question of moderate speed vs. high-speed engines was debated recently before the Institution of Automobile Engineers, F. Strickland taking the part of the moderate speed and H. R. Ricardo the part of the high speed engine. Strickland based his opposition to the high-speed engine mainly on the extremely high inertia forces at high speeds, which subject practically all of the working parts to increased stresses. Assuming certain proportions for the chief working parts and an explosion pressure of 400 lbs. p. sq. in., Strickland showed that in a four-cylinder 3.15 by 5.92-in. engine the bending force on the crankshaft at the end of the exhaust stroke increases from about 1000 lb. at 1400 r.p.m. to 8100 lb. at 4000 r.p.m.; that the bending force during the explosion stroke decreases from 2950 lb. at 600 r.p.m. to zero at 2400 r.p.m., and then increases to 5000 lb. at 4000 r.p.m. The tension on the connecting rod bolts increases in the same proportion as the bending stress on the crankshaft at the end of the exhaust stroke.

One of the arguments advanced by Ricardo in favor of the high-speed engine was that although up to 1890 the low-speed steam engine was pre-eminent, all attempts to build high-speed engines previous to that time having failed, when the Willans central valve high-speed engine appeared it swept the field within a few years, only to be displaced later by the still higher-speed Belliss engine. Strickland also made reference to steam engine history, but pointed out that the steam engine was not an apt example, for the reason that in such an engine the inertia forces can be taken up on a cushion of steam at the end of the stroke, which is not possible in a gasoline engine, except at end of compression stroke.

Strickland stated that the sizes of such parts as the crankshaft are often determined more by the amount of bearing surface required than by the stresses on the parts, and he therefore gave a chart showing the in-

crease in bearing pressure with speed. At high speeds the pressures on the center bearing of a three-bearing crankshaft grow enormously according to this chart. At 2000 r.p.m., for instance, which is not a low speed, the load on the center bearing of the engine considered is about 2100 lb., but at 4000 r.p.m. it is about 9400 lb.

THE pressures on the crank pin and rear main bearing increase in similar proportions, though they do not attain the same absolute values as that on the center bearing. These figures, Strickland argues, show that as the speed of the engine is increased, the dimensions of the shaft and the length of the bearings must be increased, and above a certain speed this increase must be very considerable. The valves and valve gear must also be made larger, and the greater weight of the valves, together with their higher speed, increases the strain on the valve gear very rapidly. The timing gear and its cover will also have to be made larger and heavier.

Strickland next proceeded to make the same comparison on the basis of engines of the same output instead of the same cylinder size. He assumed that a cubic inch of piston displacement will give the same output and took engines with bore and stroke equal, so that the bore and the stroke vary inversely as the cube root of the speed. This leads to the conclusion that an engine of 2.22-in. bore and stroke, for instance, when running at 4000 r.p.m. develops the same output as an engine of 6.23-in. bore and stroke running at 500 r.p.m. This comparison also shows that at the higher speeds the bending forces and the bearing pressures are much higher in the high-speed engine.

Taking all these points into consideration, Strickland arrives at the conclusion that increase in speed beyond a certain point, accompanied by a decrease in cylinder size, entails increased weight. The exact speed for minimum weight depends upon many points, but with the weights assumed in the examples given it appears to lie between 1200 and 1500 r.p.m., corresponding to a cylinder of from 3.62 to 4.05-in. bore. Strickland admits that as the speed is decreased the flywheel must be made heavier, but he contends that this is not a serious matter, as the flywheel in any case constitutes only a small proportion of the whole weight, especially in six-cylinder engines.

Aside from questions of weight the moderate speed engine seems to have every advantage. Since the reciprocating parts need not be cut down to the same extent the pistons can be given larger wearing surfaces, making them more durable.

Ricardo approached the problem from a somewhat different angle, holding that the chief requirement at the present time is for increased fuel economy. This can be attained by increasing the compression ratio. High compression is desirable from every point of view, for an increase in compression increases the power output and the fuel economy and decreases the cooling water temperature and the heat strain on such parts as valves and plugs. This may sound contrary to established facts,

but Ricardo quotes results obtained with his variable compression engine to bear out this point. When increasing the compression ratio from 60 to 95 lb. p. sq. in. the length of exhaust pipe maintained at red heat was greatly decreased and the exhaust valves also became cooler. At 98 lb. compression the first traces of detonation were observed, and at 102 lb. detonation was very pronounced. Increase in the compression to this valve was accompanied by a marked decrease in power and economy and a decided increase in the temperature of the cooling water. When operated under these conditions for 15 minutes the engine would pre-ignite, owing to the high temperature attained by the spark plugs. By retarding the spark it is possible to increase the compression still further, but this is done at the cost of a considerable loss in economy and increased heat flow. Enriching the mixture also permits of increasing the compression pressure, but also at the expense of economy.

Ricardo said that he recently had on the test block two engines which were representative of the two types. One was a T-head engine with spark plugs over the inlet valves, operating at a compression pressure of 75 lb. and designed to run at about 1200 r.p.m. The other was a valve-in-head engine with spark plugs in the center of the cylinder heads, operating at 115 lb. compression and designed to run at about 3000 r.p.m. Both delivered about the same power per cylinder. When operating under wide-open throttle on the same gasoline, one knocked alarmingly, the other not at all. The high compression engine gave a brake mean effective pressure of 130 lb. p. sq. in. and consumed 0.51 pints

(about 0.48 lb.) per horsepower-hour; the other had a b.m.e.p. of 80 lb. p. sq. in. and consumed 0.76 pints (0.73 lb.) per hp.-hr. As to smoothness of operation, Ricardo stated that anyone seeing the two engines running side by side would have made quite a wrong guess as to which was the high compression one.

IN order to obtain the same life as with the moderate speed engine, the load factor on the bearings must be kept down to nearly the same figure. A slightly higher load factor is permissible because of the lower oil temperature in the high speed engine, which tends to keep down wear. Owing to the much higher m.e.p. much smaller cylinders can be used. This makes the reciprocating weights much lighter, and, with a shorter stroke, the connecting rod proportional length, and therefore its angularity can be reduced. As a result the inertia forces need be little if any greater than in the low-speed engine.

In a four-cylinder engine Ricardo uses three bearings with substantial long webs. This leaves plenty of space for liberal crankpin bearings while still keeping the length of the engine within the limits set by the cylinders. The center bearing needs to be rather large and long, but this is the only increase which affects the length of the engine. Bearings should be so proportioned that

THREE has been a steady trend toward higher engine speeds in passenger car engines for many years. The average piston speed of stock car engines increased from 800 ft. p.m. in 1902 to 1800 ft. p.m. in 1914.

Many advantages have been gained from this increase, but some engineers believe that they do not much more than offset the disadvantages which have accrued.

Two well-known British engineers recently debated this point before the Institution of Automobile Engineers. Both brought out a number of interesting points, which American engineers will want to know about. This article discusses the question in general and gives a brief summary of what the debaters had to say.

the load factor is the same on all, and if this is done it need not be more than 20 per cent greater than on the low-speed engine, which will insure about the same useful life, according to Ricardo. At the same time the engine is shortened almost in the proportion of the cylinder bores.

Ricardo dismisses the argument that difficulties are encountered with the valve gear of high-speed engines as of no weight. He says that in order to insure perfect combustion at high speeds, turbulence is essential, and to induce turbulence the gas speed through the inlet valves must be made high. It is not necessary to use unduly large valves, for if carefully designed passages are provided, valves can be used of a size which can be operated perfectly satisfactorily at 4000 r.p.m.

There are three general causes of vibration in an engine of the four-cylinder type, namely, the secondary unbalanced force due to the angularity of the connecting rod; fluctuation in crankshaft torsion, and torque reaction. As regards the first, the reciprocating weights need be but little greater, and as the connecting rod length, owing to the presumably shorter stroke of the high-speed engine, can be made greater, there will be little to choose between the two types in this respect. Crankshaft torsional vibration is likely to be a serious fault, unless provided against by the use of a heavy

crank, a Lanchester vibration damper or, best of all, placing the flywheel at the center of the crank. If no such provision is made the first critical speed is likely to fall well within the operating speed range of even the low-speed engine. In Ricard's opinion torque reaction is the most serious cause of vibration; it cannot be eliminated by such simple devices as Lanchester's vibration damper and is greater in the low-speed than the high-speed.

ONE advantage claimed for the high-speed engine is that it materially reduces what has been called "rolling losses" by Dr. Riedler and what Ricardo prefers to call hysteresis in the tires, that is, the flexing of the tire material under non-uniform driving torque. This loss can be reduced by the use of a heavy flywheel, but such a flywheel makes a car sluggish, and this is one of the worst faults a car can have.

Ricardo thought it significant that for the London-Paris air service the two highest speed aircraft engines so far known had been chosen, namely, the Rolls-Royce Eagle and the Napier Lion, the former turning at 1900 and the latter at over 2000 r.p.m., a truly terrific speed for a 450-hp. engine; yet these engines were chosen, in preference to the lower speed types, the former entirely and the latter almost entirely on the grounds of reliability and durability.

Bevel Gear Burnishing Machine

THE machine here illustrated is intended for burnishing the tooth profile of bevel pinions. When in operation, a hardened gear is mounted on the driving spindle and revolves at high speed with a soft pinion. A novel rocking action of the pinion spindle in combination with a vertical adjustment of the gear spindle is claimed to result in evenly distributing the burnishing effect along the entire tooth surface.

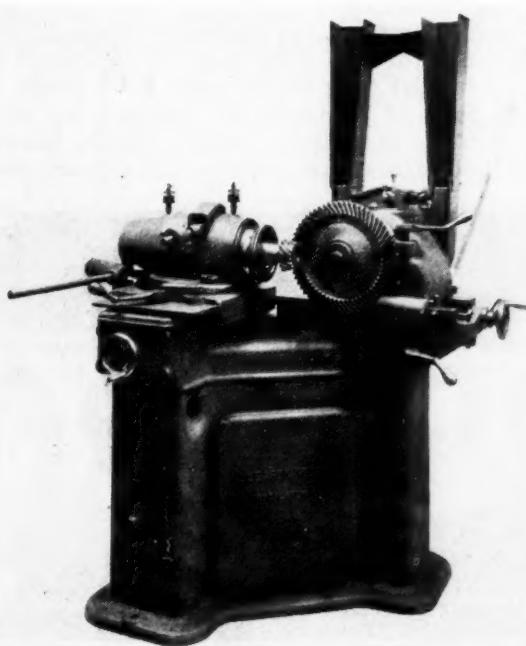
No stock is removed nor any abrasive used, hence the generated tooth-form is not distorted. The complete operation can be performed in a few seconds. The

standard machine is belt driven but it can also be arranged for motor drive if so specified.

This development is not offered as a means of eliminating all gear cutting trouble. Burnishing will not compensate for incorrect cutting, but it will produce smoother running gears by "ironing out" the small facets, or tool marks, which compose the tooth profile of any generated gear. The machine is of special advantage when used for automobile rear axle gears and pinions in which quietness and smooth running are essential. It is manufactured by the Gleason Works and is already in use in quite a number of automobile and parts factories.

New Make of Engine Bearing

THE Oakland Motor Car Co. is now using the Chadwick bronze back babbitt bearings in the Model 64. These bearings are interchangeable, the bearing materials being cast by the low pressure die casting method directly into the bronze backs. It is claimed that this method produces a very dense structure, the density being under control, thereby giving uniformity and also allowing the use of a pure tin bond which melts at 610 deg. Fahr. The interchangeable feature is, of course, obtained by accurately machining the bronze back and also the crankcase into which it fits. The bronze back bearing is made of a bronze shell, on the bearing side of which is cast a 1/32 in. thickness of babbitt metal (S.A.E. specification No. 11). The total thickness of the bearing is 3/16 in., the other 5/32 in. being taken up by the bronze. As compared with the all-babbitt type, superior strength and longer life are claimed for this bearing. It is also claimed that it has a greater heat conductivity (66 per cent more) than the plain babbitt bearing and that it runs cooler in consequence and better maintains the lubricating qualities of the oil.



Gleason 15-in. bevel gear burnishing machine

How to Secure Proper Illumination of Rear License Plates

Experiments prove that better light distribution is more necessary than increasing candlepower. Color and design of plates affect visibility. Many rear lamps of poor design on market. Suggestions offered for producing satisfactory unit.

By J. A. Summers and W. G. Morrison
Lighting Service Department, Edison Lamp Works

THE laws or regulations of many of the States require that the rear license plates of automobiles shall be so illuminated during the hours of darkness that the number can be read at distances varying in the different States from 50 to 100 ft. The average requirement is between 50 and 60 ft.

The illumination actually provided is notoriously poor, so that the purpose of the regulation is defeated. It is practically impossible to read the numbers on moving automobiles after dark, and this has resulted in bitter complaint from all classes of officers entrusted with traffic regulations and law enforcement.

Since the motorist sees no personal advantage in improving this lighting, and perhaps anticipates personal inconvenience from it, it is not surprising that he makes no effort to rectify matters, so long as he is not compelled to do so. On the other hand, he cannot be severely criticised for his neglect, because much of the equipment supplied on automobiles cannot comply with the law without mechanical changes, and further, the regulations have been so worded that one cannot readily determine just how much light should be supplied to insure compliance.

Massachusetts is the first State to take definite steps toward rendering the regulations effective. A law has been passed which requires the approval of the Registrar of Motor Vehicles, on all the rear lamp equipment

used on motor vehicles on the highways of the State.

At the request of the Massachusetts Motor Vehicle Department and the corresponding officials of several other States, the Illuminating Engineering Society's Committee on Motor Vehicle Lighting, and a committee of the S. A. E. have been studying the question, and undoubtedly these committees will bring forward good, constructive recommendations.

Determining Necessary Foot Candles

In order to handle the problem intelligently, it is necessary to first determine the strength of illumination (foot candles) necessary to provide for satisfactory vision. This is no easy matter, since there are so many possible factors to affect the result. Individual observers vary as to eyesight and quickness of perception, direction of view varies, lights in the field of view may introduce more or less glare, the motion and vibration of the vehicle will affect readability, and then the plates themselves vary as to size, color, contrast, size of figure, etc.

Any kind of observations made in the street are subject to a variety of local conditions which will affect the results. In order to provide some data which would serve as a basis of analyzing the problem, we have run a series of tests in a dark room. It is the purpose of this article to discuss the problem, and present the indi-



Fig. 1—Shadows cast on number plate with lamp above plate



Fig. 2—Illumination of number plate with type of rear lamp suggested

cations resulting from these tests, with the view of helping toward the realization of an effective solution.

First let us consider the requirements of the plates themselves. It is a well-known fact that the minimum angle of discernment of the eye is one minute, that is, the eye can distinguish separate objects if they are one minute of angle apart. At 60 ft. this would be 0.21 in., which is the minimum width of stroke and spacing of figures permissible, even under ideal conditions. How-

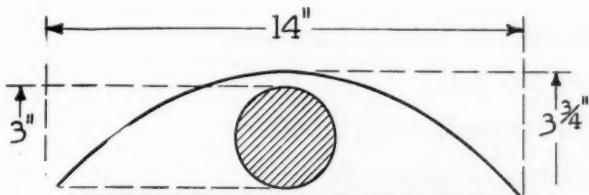


Fig. 3—Form of tail light reflector suggested.

ever, as actual conditions are far from ideal, the minimum would not be advisable. It was the opinion of all observers present at the test that a fairly thin stroke— $3/8$ to $7/16$ in. wide—well spaced figures, $1/2$ in. or more, was more legible than a wide stroke and wide spacing or any kind of a stroke with a narrow spacing. If the stroke is too wide, the figures have a tendency to run together. Every effort should be made to make the figures stand out clearly, as they can then be read with greater speed and with less illumination.

The shape of the figures should be such that they are not readily confused. In the block letter so frequently used, the 3, 6, 8 and 9 are often confused when viewed hurriedly, while letters of the shape used on the 1922 Massachusetts and Ohio plates are much more legible, largely because of the greater opening of the figures.

Contrast between figures and background should be maximum. Black and white are the best colors, and no difference in visibility could be detected, whether letters were black on a white background or vice-versa. Other dark colors, such as dark blue and dark green, when used with a light contrasting color, are also quite good.

Test of Visibility

In order to secure an average condition, license plates were secured from every State possible. Thirty-three States responded, and tests were run on each one of the plates. The plates were set up against a black background at 60 ft. from a group of observers. An even intensity was thrown on the plates and raised in steps until all the observers could read the numbers. It was found that the intensity in foot-candles required varied from 0.10 for the plates of Maine, Rhode Island, Texas and Utah, to 0.30 for the plates of Alabama, Florida, Kentucky, Minnesota, Montana and North Dakota.

In the first test no time limit was set for the reading, and the observers could study the figures as they could on a standing car. However, if the car were moving, a definite time limit would be set, depending on the speed of the car, in which the plate would be visible. Assuming a speed of 20 m.p.h. a car would travel the 60 ft. in about 2 sec. It was, therefore, assumed that an intensity sufficient to read the plates in 2 sec. was a minimum. Starting with the intensity at which the plates could be read when plenty of time was afforded, the intensities were increased until all observers could read the figures in 2 sec. The results showed that the plates of North Carolina, Pennsylvania, Texas and Utah required only 0.20 foot-candles, whereas those of Montana required 0.60 foot-candles, these being extreme values.

Investigation of the available types of rear lamp

equipment disclosed a deplorable lack of good design. A very high percentage of cars use the familiar small bull's-eye type, 3 in. in diameter, with an opening an inch wide, cut in the side. The opening does not cover a sufficient arc to light the entire plate, and, being covered with mica or celluloid, after a short period of use absorbs a high percentage of the light. Fig. 1 shows the shadow cast with the unit mounted over the center of the plate, and the intensity in foot-candles secured at various parts of the plate, using the standard 2-c.p. Mazda lamp.

Light Distribution

The first thought, naturally, is to use a larger lamp to get more light, but this is not a solution of the difficulty, as it is a question of distribution of light more than quantity of light. There is plenty of light available in the standard 2-c.p. Mazda light, if it is properly distributed over the plate, and there is no reason for alarm that there will be an additional drain on the battery.

It is a very simple matter to design and there are no commercial difficulties in the way of building a unit at a low price, which would satisfy the most rigid requirements likely to be imposed. Only the most elementary principles of reflector design are necessary to produce a satisfactory unit. In order to demonstrate this, a unit was built in the laboratory and even this crude model gave a distribution of light which would furnish more illumination than the tests would indicate to be necessary. Figs. 2 and 3 illustrate this unit with the intensities in foot-candles at various parts of the plate secured with a 2-c.p. Mazda tail light.

The face of the unit is a section of a parabola 14 in. long, $3\frac{3}{4}$ in. deep and $1\frac{1}{2}$ in. thick, and painted on the inside with flat white enamel. The illumination with this unit (or with almost any unit) would be materially increased if placed about an inch above the plate and tilting either the plate or the unit so that the lower edge of the plate would come to the same line as the front face of the unit.

To draw any definite conclusions from these preliminary tests, it would be necessary to assume that a State would supply license plates of a fair degree of contrast between figure and background, and well spaced numerals. With this assumption, the test would indicate that a minimum intensity of illumination of 0.5 of a foot-candle at any part of the plate would satisfy all average conditions, due allowance being made for such moderate depreciation as would naturally occur during the year.

Gummy Deposits in Gasoline

A STUDY of various methods of evaporation and oxidation of cracked gasolines made by the Bureau of Mines leads to the conclusion that gummy and resinous deposits are caused by oxidation, and have no direct relation to unsaturation as determined by solubility in sulphuric acid.

In the investigation made by the Bureau a new and convenient method was developed for determining "gum" in gasoline. The study of gums and their formation leads to the conclusion that they are polymerized aldehydes, which probably are formed by the oxidation of olefins, etc. Storage tests confirm the above conclusions.

Details of the investigation made by the Bureau of Mines are given in Serial 2394, a pamphlet entitled "Gum-Forming Constituents in Gasoline," which has recently been issued by the Bureau.

Builders of Closed Bodies Assured of Big Business in 1923

Output will average about 35 per cent of total. Increase in demand is not likely to be sensational. Sport types also have strong appeal. Plan must be made to get dealers models they want when they want them or sales will suffer.

CLOSED-CAR production for 1923, so far as it can be estimated from the tentative schedules of the leading companies, will show a substantial increase over 1922, but the growth in demand will not be so sensational as it has been this year in comparison with 1921.

Taking the output of the entire industry for 1922, the percentage of closed cars probably has averaged between 27 and 28. On the same basis, the percentage for next year probably will average from 33 to 35.

According to price classifications, the closed car production for next year probably will be between 25 and 30 per cent in the low-priced lines; between 30 and 40 per cent in the medium field and between 40 and 60 per cent in the high price class.

The big business in closed cars this year has been due in large measure to the development of low-priced models early in the year by two or three far-sighted companies which sensed the trend of public demand. When it became apparent that with a sharp reduction in price there would be large sales of closed models, practically all companies went after a share of the business.

Notwithstanding the heavy sales of closed cars this year, there is a strong feeling in Detroit that 1923 will bring a pronounced demand for special sport models and that public interest will be centered on them. Until the last few months, prospects have had to make their selections, for the most part, from standard open models, low-priced closed jobs or standard closed cars.

PRACTICALLY all manufacturers have made haste recently to get into the sport model field. They have found that such cars possess a strong appeal for the purchaser and that the price differential of \$100 or more over the standard open line does not appear to have limited the demand in the least.

It remains to be seen whether this estimate of demand is entirely correct. It may be that the sport models will prove to be more or less of a fad, although there probably will be a strong demand for them in the spring. It undoubtedly will be found in the future, as the prices of closed models are brought steadily nearer to those of open cars, as they will be, that the volume of closed car sales will approach more closely the total of open model business and ultimately exceed it to a considerable degree.

When there is no great difference between the price of a touring car and a coupe or sedan, it will be found that the average purchaser in cities and towns where the weather is not mild the year 'round, will favor the closed model. There always will be, however, a big field for the sale of open cars in sections of the country where there

is no real winter and among farmers.

The sport model, or anything "different" also will have a strong appeal to many persons, especially the younger generation and there is substantial reason for expecting a heavy sale of such cars.

It unquestionably is true that the shortage of bodies has held down the sales of closed cars all this year and some of the companies making popular lines are far behind on deliveries even now. The demand for closed models, at reasonable prices, was underestimated early in the year and a great many people who actually preferred them have had to be content with something else because they could not get what they wanted. When they come into the replacement market the chances are that they will still want a closed job.

SOME system must be worked out in the automotive industry under which people can get what they want when they want it. It is comparatively easy to buy closed cars in the spring and open cars in the winter, but no plan has been devised under which dealers and prospects can get an ample supply of the kind of vehicles they desire at all seasons. Dealers in the more popular lines have been far behind in deliveries of closed cars all year and this fact has cost them many sales.

When a dealer or a distributor can sell more closed cars than he can get in November and December it doesn't soothe his temper to have his factory sales manager tell him what a noble thing it would be for him to stock a lot of nice, new open cars for spring delivery so his customers won't have to wait. The sales he's going to make in the spring don't pay overhead in the winter.

It should not be forgotten, either, that when he stocks open cars for spring sales, he has to pay cash for them and if the factory decides, before the spring selling season opens, to reduce prices the dealer has to pocket a loss instead of make a profit in a good many cases.

FACTORIES are going to have increasing difficulty in convincing dealers that it's their patriotic duty to pay cash for cars and then warehouse them for three or four months just so they'll have a stock on hand when they get a chance to sell them. They'll contend that it's the business of the factories to make prompt deliveries of merchandise when it can be sold to the best advantage.

They will point, for example, to the clothing industry, in which summer clothes are made in winter and winter clothes in summer.

One outstanding reason for the shortage of closed cars this year has been the inadequate body building capacity of the country. This condition will be greatly improved

by the beginning of 1923 and manufacturers generally seem to have provided for their needs.

Ford, in its own factory at River Rouge, can build about 1000 sedans daily and the Briggs Mfg. Co. gives it 500 coupes a day as well as about 200 of the new four-door sedan type. Chevrolet, soon after the first of the year, will complete body plants at many of its car manufacturing and assembly plants which will give it adequate body supply to meet any demand. The body plants will be operated by Fisher.

PRACTICALLY all the closed bodies for General Motors cars are being built by Fisher, though there are exceptions in which they are made by companies outside the corporation. Fisher is operating upward of thirty plants in and around Detroit and Cleveland, and except for General Motors is building only closed bodies. Approaching completion is a huge plant in Detroit which will give Fisher an additional 1,000,000 ft. of space for its body manufacturing requirements.

Dodge Bros., now making all their own bodies, will complete soon after the first of the year a large addition which will be used almost exclusively in meeting body requirements. Dort makes all its own bodies and declares its plant facilities adequate to meet demand. Hupp controls its source of body supply and is prepared to meet increased business. Maxwell-Chalmers has its own body plants and while these have fallen down badly in meeting closed body demand this fall, their facilities are being extended to meet additional requirements.

STUDEBAKER operates its own body plants and is extending them to provide for a larger closed car business. Hudson-Essex has been hard pushed to meet demands for its coach models, but has kept abreast of them fairly well because of simplified assembly. The Hudson sedan body is made in Amesbury, Mass., and the business has outstripped the body factory production capacity. Hudson has not announced plans for more adequate supply, but undoubtedly will make them.

Lincoln bodies are being made by custom body builders exclusively and output is consequently limited. The completion of an addition to the Lincoln plant now under way is expected to provide for the building of some body types there, so that production in these models will be greatly increased. Gray bodies are being made by the Kelsey Wheel Co., which has facilities to manufacture any number of any type required.

Packard gets its closed bodies from the Towson Body Co., Detroit, and its open bodies from the Pullman Co., Chicago. Both of these companies are equipped to handle any increase in Packard business which may arise. Paige-Jewett bodies are made by the Wilson Body Co., which is making a large increase in its factory space.

The Durant body supply for Stars and Durants is not anywhere near ample to meet the production requirements they have outlined, but plans have been made to

meet requirements by the organization of new companies.

CLOSED-CAR demand is now running about 33 per cent with Ford and Chevrolet; Hudson and Essex, with their coach popularity, are exceeding 50 per cent. The same is true of cars like Cadillac and Packard, whose demand is close to 75 per cent. Similarly, the General Motors companies with low-priced closed models with Fisher bodies are having a closed business approximating 50 per cent. This figure probably is an average for all medium-priced cars now. Many factories, however, are not able to get closed bodies up to this figure. Sport cars now are winning buyers who otherwise would be in the closed-car market, easing the situation somewhat.

Now that provision has been made for meeting the body needs of the industry, there will be less legitimate excuse for those manufacturers who fail to fill orders promptly.

CONCEDING that it will be impossible at the beginning of each year for factories to establish arbitrary production schedules for models of various types, they can determine more definitely than they have in the past, by scientific sales analysis, what the probable demand will be.

It is perfectly logical to assume, for example, that inasmuch as the major part of automobile buying this year has been in the larger cities and industrial centers, it will switch in 1923 to the agricultural sections which possess 45 per cent of the country's buying power. This would include the Middle West, the Northwest, the Southwest and the Southeast.

The farmer, generally speaking, is not addicted to the closed car. He wants not only open cars, but open cars without frills, so he is not an enthusiast over sport models, either. He is the man to whom the Ford is sold without starter or demountable rims. He prefers to turn the crank and save \$95. He buys with an eye to economy.

While it is logical to assume that buying will shift to the rural districts in a few months, buying ability isn't going to be equal in all such sections. This is one illustration of why careful market analyses now will mean profits a few months from now. What seems on the surface like a perfectly logical conclusion does not always work out in practice.

BODY design and body production methods are becoming increasingly important. Body changes and refinements rather than chassis improvements will be featured at the New York and Chicago shows.

No matter how long the strides which may be taken in body design and production, however, they will not attain their full measure of importance unless manufacturers can work out better than they have in the past the problem of getting into the hands of dealers a plentiful supply of the models prospects want when they want them.

New Hardening Method for Steel

A NEW method of treating steel, which is claimed to permit of obtaining a higher degree of hardness than has been attained before, has been patented in France by the Swenska Kugellager Fabriken. After the steel has been hardened in the usual way, by heating and sudden cooling, it is subjected to a mechanical process, such as

pressing, shearing, hammering or drawing, under such conditions that the elastic limit of the hardened steel is exceeded, so as to produce a permanent deformation. By varying the pressure employed and the time during which the treatment is continued the effect can be caused to penetrate more or less deeply into the metal.

Truck Rating Must Be Standardized to Avoid Unjust Legislation

Commercial vehicle a carrying tool, not a measuring implement. Overloading often due to improper basis of classifying chassis. Simplified and unified lighting laws necessary. National Highway Traffic Association convention brings out many good points.

CLASSIFICATION of motor trucks as measuring tools rather than carrying tools has been responsible in a large measure for the inauguration of regulatory statutes in many States, David C. Fenner, manager of the public works department of Mack Trucks, Inc., told delegates to the convention of the north central division of the National Highway Traffic Association in Grand Rapids last week.

Fenner's talk, with a paper on "Lights for Highway Vehicles," by David Beecroft, directing editor of the Class Journal Co. and vice-president of the North Atlantic Division of the National Highway Traffic Association, featured the meeting.

Roy D. Chapin, president of the Hudson Motor Car Co. and Michigan director of the National Highway Traffic Association, was chairman of the afternoon session and spoke at the evening session on financing of State highways. Arthur H. Blanchard, president of the National Highway Traffic Association, spoke on the "Economic Value of Highway Transportation Franchises," and George H. Pride, treasurer of the National Highway Traffic Association, spoke on "Regulations covering speeds, weights and dimensions of motor trucks, tractors and trailers."

On the subject of overloading, Fenner said: "We are handicapped for lack of standards for truck rating and classification so no comparisons can be used. A motor truck is a carrying tool but not necessarily a measuring tool. It should be in the same general classification with the shovel and wheelbarrow and not with the quart, peck and bushel basket. Truck overloading is due in part to the improper basis of rating and classifying the motor truck chassis in terms of the manufacturer's rated pay load capacity. The user soon learns that this does not mean anything.

"He attaches a body which may or may not fit either the chassis or the commodity he carries and loads it to suit himself. The motor truck body is the real measure of capacity which determines the size of the chassis which must be used to carry it loaded with the commodity to be handled.

Truck Buyer's Needs Must Be Studied

"IN the sale of motor transportation the successful salesman conducts a survey which convinces the customer that a certain type, capacity and weight of body is necessary to fill his transportation requirements. He sells the customer this body and then he is in a position to sell the proper type and size chassis to carry this body loaded to capacity with the particular commodity.

"Truck manufacturers have suggested that State motor vehicle commissioners should refuse a license for any motor

truck which is not equipped with a manufacturer's caution plate properly stamped with the actual weight of chassis, body and load. Manufacturers are now preparing to go a step further and include in the plate the maximum load for the front and rear axles, the maximum speed and the distance in which the vehicle loaded to capacity can be stopped with each set of brakes operated independently when running at the above speed on a hard, dry, level roadway.

"The information on this caution plate will give the owner the data he needs for painting the weight and carrying capacity on the side of the vehicle to comply with the State laws. It will also enable the enforcement officers to check up weight distribution, speed and condition of brakes. A similar plate for home-made trucks can be issued by the State Department."

Sane Laws Desirable

PROFESSOR BLANCHARD said that responsible operators of motor-driven vehicles would welcome the passage of the laws relative to highway franchises making for improved service. Operators, he said, have nothing to fear from commissions composed of men of vision, with a broad general knowledge of transportation and without prejudices against any form of transportation. He suggested a board of five as the proper number on which would be a highway transport man, a highway engineer, a business man familiar with large commercial problems, a banker familiar with bonding and State Attorney-General as an ex-officio member.

Accidents on highways due to faulty lighting of motor vehicles were supplemented in many instances by improper road conditions, Beecroft said, due to poor highway illumination, curves and other dangerous conditions. The A, B, C of highway lighting is yet to be written, he said, and experimental work now being done gives promises of excellent results.

Traffic conditions now demand that all vehicles using highways should carry lights, he declared, and said the unlighted horsedrawn vehicle was a menace to itself and other users. Furthermore, these lights should be standardized so that a knowledge of the district would not be necessary to interpret the lights. Good lighting on vehicles should be simplified in every instance rather than made more intricate.

Pride said there would be 60 per cent more trucks on the highways than now if weights are limited to three tons, meaning an increase in traffic congestion and accidents. It would increase by 40 per cent the cost of hauling the additional ton or two that might be accommodated on a five-ton vehicle.



Air and Water Cooled Engines Compared

Test data quoted to show that there is no great disparity between the two types in respect to maximum temperatures, fuel consumption, output, or valve and piston reliability.

Editor, AUTOMOTIVE INDUSTRIES:

Mr. Ludlow Clayden rightly claims that the accumulated knowledge of water-cooled engines is vastly greater than that of the air-cooled type. However, most of the data on water-cooling concerns temperature conditions within the jacket rather than within the cylinder walls, and, since the latter have the major influence in performance, it would seem that much of the knowledge is superficial.

As regards cylinder wall temperature conditions and the effect thereon of variations of mixture strength, compression ratio, spark advance and cooling medium supply, etc., very little published data are to be found concerning water-cooled engines. In fact, only three or four such investigations are known to the writer. Relatively, the air-cooled engine is in a much more advanced state, as all the above variations have been the subject of careful and extensive research.

There is no parallel in water-cooled engine data to the published results of Gibson's classic investigation of air-cooling at the Royal Aircraft Establishment,¹ and the writer has no hesitation in claiming that in fundamental knowledge of cooling, the air-cooled engine is in a much more advanced condition than the water-cooled type.

The relatively large amount of existing data on wall temperatures in air-cooled cylinders is mainly due to: first, the necessity for such investigation as a preliminary to the production of air-cooled cylinders of high output and efficiency; second, the facility with which such temperature conditions are determined; and third, because the effects of bad thermal design are readily apparent, the air-cooled engine designer having no convenient equivalent of a water jacket with which to cover his sins.

In the article on "The Evaporating Type of Cooling System" reference is made to temperatures of over 400 deg. Fahr. in the jacket. It would be of interest to know if these temperatures were measured in the jacket (not in direct contact with the cylinder wall) or were cylinder wall temperatures. If the former be the case, there is little doubt that the wall temperatures would be considerably in excess of 400 deg. Fahr.

MR. CLAYDEN states that the temperatures in air-cooled cylinders are far in excess of anything existing with steam-cooling. While this may be so, the writer is very much inclined to doubt it, particularly in view of the deliberately sluggish circulation used with steam-cooling, especially in side valve engines on account of the

restricted tortuous passages available for the steam flow around the valve ports, seats, etc.

The average water-cooled engine exponent is satisfied with the assumption that, under normal conditions, the maximum cylinder wall temperature is only slightly in excess of that of the water at the jacket outlet. This assumption, while comforting, is unfortunately not in accordance with the facts of the case, at least for aircraft engine cylinders, and, if the writer is not mistaken, still less so for the average automobile engine, particularly if fitted with thermo-syphon circulation.

Tests by the Engineering Division on a "Liberty" cylinder have shown that, under the best conditions at full throttle (normal speed and water temperature), the combustion chamber wall at the hottest point is 140 deg. Fahr. above the temperature of the water at outlet and that when the walls become covered with scale this temperature difference may rise to over 250 deg. Fahr. Owing to deflection of the cylinder head under explosion pressure, the scale in the Liberty does not much exceed 0.025 in. in thickness before it flakes off. If a temperature difference of 250 deg. Fahr. be obtained with such a thin coating of scale, it can well be imagined that the temperature difference between cylinder wall and water will be far higher in designs in which the scale builds up to $\frac{1}{8}$ or $\frac{3}{16}$ in., a thickness by no means unusual. Direct determinations of thermal conductivity of scale appear to be lacking. However, in normal scale calcium sulphate is the predominant constituent, and the thermal conductivity of this, in the form of made up plaster of paris, is .0012 in C.G.S. units.² As this shows 100 times the resistance to heat flow of that of cast iron, it is sufficient to indicate the order of the effect of incrustation, even if, thermally, plaster of paris is somewhat unlike scale.

IT may be well to emphasize here the fact, that fairly heavily scaled cylinder walls are the normal condition of the average water-cooled engine.

The tests of the Engineering Division have shown that the wall temperature of the Liberty cylinder is not greatly affected by boiling. This, however, is by no means the case for all engines, particularly aircraft engines with thin walled steel cylinders, having the jacket space and outlets restricted in such a manner as to allow of the formation of permanent steam pockets. The formation of a steam pocket often results in the cylinder wall in the vicinity of the pocket becoming red hot, and such conditions have given considerable trouble in aircraft engines in the past and are by no means unknown in thermo-syphon cooled automobile engines.

¹Air-cooling of Petrol Engines. Proceedings of the Institution of Automobile Engineers, XIV.

²Dictionary of Applied Physics, vol. I, Glazebrook.

As a comparison between water-cooled and air-cooled cylinder wall temperatures, it may be of interest to quote figures for a Liberty single cylinder (5 in. bore by 7 in. stroke) running at 1700 r.p.m. and an Engineering Division type J air-cooled cylinder (5½ in. bore by 6½ in. stroke) running at the same speed.

The Liberty cylinder, when scaled up (average normal condition), shows a wall temperature of 430 deg. Fahr. at the hottest point of combustion chamber with a water outlet temperature of 170 deg. Fahr. The type J cylinder when running for long periods at full throttle in a 90 m.p.h. blast shows an average wall temperature of about 450 deg. Fahr., usually nearer 400 deg. Fahr.

WITH regard to mean cylinder wall temperature, there is probably no great difference between air and water-cooled types; the water-cooled, undoubtedly, being somewhat the lower with normal water temperatures.

With air-cooled cylinders in the neighborhood of 160 cu. in. capacity, mean wall temperatures of the order of 300 deg. Fahr. are fairly readily obtainable at continuous throttle and in 60 cu. in. sizes, 250 deg. Fahr. or less is easy to attain with maxima under 500 deg. Fahr. in each case.

While the maximum permissible cylinder temperature in an air-cooled engine is not fully determined, it is, however, fairly well accepted that around 500 is a desirable aim for large cylinders operating continuously at full throttle.

For automobile engines short periods of high temperature at full throttle cause no damage. The writer has measured a maximum cylinder temperature of over 600 deg. Fahr. while mountain climbing on the road. This temperature caused no damage and did not produce poor running beyond somewhat increasing engine noise. In an automobile engine the fuel economy between three-quarters and full throttle is not of great importance, and by using a specific consumption of 0.7 lb. or more per b.h.p. hour in this range, much can be done to secure automatic temperature control and further to reduce detonation, etc., arising from any hot spots that may develop.

Mr. Clayden cites piston and exhaust valve trouble as primary difficulties of air-cooled engines, and in this connection it may be of interest to cite the results of a recent endurance test carried out by the Engineering Division on a Type J cylinder. This test was for exhaust valve endurance and consisted of 100 hours on full throttle at 1700 r.p.m. After the first 50 hours the fuel supply was cut down and the spark advanced to such a degree as to cause more or less continuous auto-ignition, this with a view to increasing the severity of the test as much as possible.

AT no time during the test was the exhaust valve given attention other than inspection and at the conclusion was only slightly scaled on the seat to an extent which could readily have been removed by grinding. At the conclusion of the test the exhaust valve seat in the cylinder and the exhaust valve guide were the only por-

tions of the cylinder body requiring attention, and throughout the run the only troubles experienced were with worn parts in the valve operating gear. During the last 50 hours of the run, the fuel consumption averaged less than 0.5 lb. per b.h.p. hour and for one 5-hour period was 0.45 lb. (compression ratio 5.25 to 1, fuel 80 per cent aviation gas with 20 per cent benzol).

WITH regard to piston trouble, it is the writer's experience that piston burning is and has been much less prevalent in air-cooled aircraft engines than in water-cooled types of similar size and performance; in fact, it has been almost unknown in the air-cooled aircraft engines.

The piston used for the last 50 hours of the test cited above, at the conclusion, showed only the very slightest of pitting, and this confined to a very small area. The majority of water-cooled engines after such a test, especially with so much auto-ignition, will show deep and heavy piston pitting.

The writer, while acknowledging that a vast amount of work has yet to be done on the air-cooled engine, would suggest that the foregoing figures tend to prove that no great disparity exists between the water and air-cooled types, as regards mean and maximum temperatures, fuel consumption, output, or valve and piston reliability, etc.

The question of wall temperature in water-cooled cylinders is still under investigation of the Engineering Division and will be adequately dealt with later by others more competent to discuss water-cooling than the writer. S. D. HERON. Power Plant Section, McCook Field.

New Model Russel Truck Axle

A NEW model of internal gear drive axle to take the place of the Model 8500-I of the series brought out something over a year ago has been announced by the Russel Motor Axle Co. It has a 2½-ton rating and is to be known as Model 82. As compared with the former design the pitch diameter of the bevel gear has been increased from 6 to 7.2 in., the number of the teeth in the gear from 24 to 27 and the face width from 1½ to 1¾ in. A much larger differential with drop-forged, heat-treated housing (instead of a cast housing) is now used, and the differential gears, pinions and spider are also heavier.

The jackshaft pinion bearing has been increased from No. 1407 to 1408 and the number of teeth in the pinion from eleven to twelve. Chrome nickel steel has been substituted for nickel steel (No. 2320). The bearings on the bevel drive pinion shank have also been increased from Nos. 1408 and 308 to Nos. 1409 and 309, and the large end of the taper on the shaft from 1¾ to 1½ in. diameter. Larger differential bearings have also been adopted. These changes have necessitated numerous other minor alterations. The weight of the axle has been increased 55 lb., all of which additional weight is in the driving mechanism.

Siam Has Again Begun to Buy Automobiles

Four groups of potential purchasers constitute one-ninth of population. Chinese merchant class largest. Roads good. Small market for trucks. Tractors needed for hauling and some cultivating.

OF the 9,000,000 inhabitants of Siam, more than 8,000,000 are hopeless as purchasers of automobiles. There are, however, four groups of potential buyers. The largest of these is the Chinese merchant class and many of this group, 500,000 strong, have the ambition to buy the best type of car of which their purse is capable. The European residents, totaling about 2000, are practically to a man buyers, especially if their period of residence extends over a number of years.

State officials constitute an important buying group, though many of them, like the Chinese, cannot aspire beyond a motorcycle. Lastly come the Siamese nobility, prompted by the King himself to indulge in the best types of car on the market. Medium and light makes, however, are most popular in Siam.

Siam depends much on the rains for its prosperity. Sufficient water cannot be got to its paddy fields, and shallowed waterways hold up the deep sinking teak. Motor exporters, it is feared, do not take sufficient notice of agricultural and commercial forecasts in various countries, especially in those whose fortunes depend almost entirely on one or two commodities.

Weather Conditions Govern Sales

SIAM is one of these countries. In 1920 trade was bad owing to drought. The export of rice was forbidden and the teak could not be floated down to Bangkok or Moulmein. The result was stagnation, and, though imports had not been excessive, the motor market became overstocked. Last year the rains were normal and business in rice and teak was good. The result has had its reflex in the motor market and the majority of the surplus vehicles have now been absorbed.

During the war the United States made a determined effort to gain a virtual monopoly of the Siamese motor market. To a degree it was successful, but the revival of European competition, combined with the unsatisfactory harvest in 1920, have induced America to relax its grip. It is a mistake to attribute the decline in demand for American motor products during 1921 to the national lack of roads, lack of capital, high operation costs, and oriental conservatism. As a matter of fact, the value of cars and parts increased last year and matters have so far improved that it is stated that Siam is now absorbing 50 cars a month.

At the beginning of 1922 it was estimated that 1483 passenger cars were in the country. Five per cent of these cars were fitted with straight-side inch (Michelin) tires; 20 per cent with inch clinchers and the remaining 75 per cent with metric clinchers. Most of the tires came from the United States, Great Britain, France and Italy.

The United States and Canada combined sent 167 motor vehicles to Siam last year, the average price of each being \$1,480. The Canadian exports were mainly the products of American branch factories. Against these, Great Britain sent 64 passenger cars and 67 motorcycles, the unit value being \$2,880 and \$363 respectively, while France sent 35 passenger cars, each of which averaged \$2,917 in price. Both Germany and Belgium showed signs of regaining a footing in this market.

Chief Cities of Distribution

SINGAPORE is best endowed to be the main distributing center for the territory, although Manila, 1400 miles from Bangkok, and nearer to United States ports than Singapore, has a strong claim. At either of these ports, not only reserve stocks but supplies of spares should be kept, ready to be forwarded as desired to agents in Bangkok, for Central Siam; Chiengmai, for Northern Siam; and Singora, for Siamese Malaya. The best method of doing business with Siam is on the credit basis of from 30 to 90 days. The endeavor to enforce the cash against documents system of payment has proved unpopular.

Three points in favor of motor transport in Siam are:
1. Running conditions are ideal—1908 types still operate in Bangkok in perfect condition;
2. Labor is said to cost more here than in any other country of the Far East;
3. The high rate of exchange temporarily gives the local more buying power.

In addition, it is the Government's policy to foster the wide introduction of motor transport by constructing suitable roads with all the speed that finance will permit. Cement is made in the country, road construction material abounds in the north and south, modern equipment has been introduced, while the walls of many of the ancient towns are being pulled down to supply road materials for immediate local use.

The demand for trucks will be limited until the country is opened up away from railroads and waterways. Tractors are wanted for hauling teak and, where suitable, for cultivating rice.

THE firm of Gordon, Frazer & Co., Ltd., Colombo, states that the rubber solution used in road making consists of ordinary low-grade scrap rubber heated in a cauldron until it becomes liquid. The lowest grade of rubber is suitable for the purpose. Earth scrap, cuttings from low-grade crepe or sheet, or any other refuse rubber may be used. Earth scrap rubber is now being sold in Colombo for about fifteen Ceylon cents a pound.

Growing Demand for More Flexible Production Equipment

Percentage increase in total new car demand growing smaller yearly. Industry becoming more susceptible to outside business conditions. Manufacturer must learn to make profit on fluctuating production program. Readjustments demand flexible equipment.

By Harry Tipper

AS the curve of new production requirements in the automotive field becomes flatter and flatter, the immediate surrounding economic circumstances will affect the industry more closely, so that the fluctuations in actual sales conditions produced by these varying economic circumstances will affect the individual manufacturer in the stability of his production arrangements. Up to the present, except in the deflation period through which we have just passed, the automotive field has been in a position where short crops, poor business in one industry or another, have had little effect upon its production program. From the curves of production which have appeared in *AUTOMOTIVE INDUSTRIES*, it is obvious that the industry itself is approaching the flat part of the curve of growth where the percentage of increases per year becomes smaller and smaller in proportion to the total volume.

This condition increases the susceptibility of the industry to outside influences. A reduction of the farm market, bad business in the textile, steel, or other basic lines, will react upon the industry more directly than heretofore, and will operate to reduce the sales below the maximum production point temporarily. The new business percentage will not be sufficient to provide a profit for the manufacturer in itself, consequently, it will be necessary for him to learn how to make a profit on a production program which may go below 90 per cent of capacity for a considerable portion of his production year in case the outside industries are less than maximum themselves in values and volume.

This problem worked its way into the production meeting of the Society of Automotive Engineers in Detroit and found expression in a sharp reaction in the opinions of some of the production men against inflexible production equipment. It is obvious that the production plant

which is extremely specialized in its arrangements for one particular purpose on the basis of a full day's run in each department is not in a position to rearrange its processes so that profits may be made on a portion of the production volume.

Great Britain has been obliged for a good many years to make money on a production requirement less than maximum capacity in some of our industries. Except for

the period of the war, on very few occasions in the last 25 or 30 years, has the full population of Great Britain been employed in the manufacturing and trading necessities of her markets. Because of her worldwide trade, her industrial fabric has been extremely susceptible to fluctuations, and this susceptibility has found its expression in a shortening of trade in one quarter or another. Consequently, manufacturers, traders, transportation companies and all sorts of organizations, have been obliged to learn how to make money on a fluctuating production which was about maximum capacity only occasionally.

While the problem is not acute in this country, and particularly in the automotive field, nevertheless the curve of growth shows that we are definitely in a flatter part of the curve, so that the percentage of increase will not be enough in itself to provide a continuous employment of all the manufacturing facilities in the face of fluctuating economic conditions outside of this industry.

The situation is complicated by the fact that, as the curve of growth reaches the flatter part of its development, competition becomes keener and the reflection of this competition upon prices demands a closer consideration of costs in order that a profit may be secured. All the problems of manufacturing are involved in this situation, but the two most important problems are the effect upon production methods and the effect upon marketing necessities.

THE curve of production requirements which was recently published in "Automotive Industries" shows that the percentage increases per year are becoming smaller and smaller in proportion to the total volume.

Harry Tipper discusses in this article the effects which this flattening out in the growth curve will have on the industry as a whole. He shows that economic conditions will play a greater part and cause fluctuation in production requirements.

Business will not be had in sufficient quantities to keep all manufacturers working at capacity the year around. The manufacturer who makes a profit must do so when working at below capacity. Tipper points out that an adjustment of processes leading away from the use of the one-purpose machine may be expected.

The automotive field has been engaged in supplying a market already overdue when the automobile arrived. The pressure from this market was so great that the important problem has been to establish a more rapid rate of production speed.

Speed of production can be accomplished most readily by standardization and subdivision, with special equipment for the processes arranged as nearly as possible automatically and highly specialized in character. Consequently, the production of automobiles has been worked out so that it has entirely revolutionized the practice in the metal trades field. Special machinery devoted to one purpose has been produced and used in unheard of quantities and standardization has been carried out to a degree far in advance of any other metal trades industry, even as the practice stands to-day.

THESE methods are very valuable in providing a speed of production capable of meeting the pressure of a large virgin market. Their value as we approach the flat part of the curve and are subject to the small percentage of increase is not so clear. At any rate, the factors are different and the production problem must be examined from a new standpoint.

Where an industry has reached its maximum possibilities—that is, when it has reached the point at which its future development is dependent upon the general growth of population and wealth—the process of manufacturing must be sufficiently flexible so that a profitable business can be done under the marketing requirements which frequently demand much less than the maximum production capacity. This flexibility requires a rearrangement of the processes and assemblies so that the elimination of a percentage of the workers will not leave the fixed overhead charges and equipment costs of the idle part of the factory sufficiently large to absorb the profit on the rest of the processes.

The pressure of the market and its demand for speed in production place the emphasis on time, so that the production engineer will solve his problem by the reduction of the time required in the working out of any of the processes of manufacture. Where the plant may be subject to market requirements fluctuating below, as well as above present capacity, the cost of the investment in equipment, the cost of the idle time and the variation between the overhead of the machine and the wages of the worker assume greater importance than the single factor of time saving in the operation.

Much of the specialized machinery going into metal trades manufacturing to-day, and particularly in the automotive field, costs a great deal more per hour in space, investment, idle time cost, etc., than the wages of the worker. Sometimes this cost is several times the wages and, as a consequence, a comparatively small percentage of idle time will take the profit out of that individual process entirely. As a result of this, the variation between all the factors of expense entering into the indi-

vidual operation, and the possibility of profit from that operation, become vastly more important to the manufacturer. Business approaches the maximum and the curve of future growth becomes flatter.

It is to be expected that some adjustment of the processes leading away from the entire use of the one-purpose machine will take place in a good many factories in the future, and that a larger use of jigs and fixtures will be introduced in order to turn more flexible equipment into the one-purpose requirement, so that they may be adjusted more readily to the fluctuating necessities of the manufacturer without absorbing so much cost in the fixed factors entering into the cost of the operation. It is important, however, that this analysis should be conducted with due reference to the character of the labor common to the automotive field.

The automotive industry is the largest metal trades industry; in fact, probably the largest industry for the manufacture of a single finished product. The processes are more varied than in any other line of metal trades manufacturing and the volume of machinery used is much greater. Consequently, the automotive field absorbs a very large percentage of the skilled mechanics of the country. It has very largely trained its own mechanics by virtue of necessity. These mechanics have been trained in the standardized methods used in the field and a very large percentage of them are accustomed to working semi-automatic or automatic machinery. Only a small percentage of them are skilled mechanics in the older sense where they were capable of taking a simple standard tool, operating it on a number of different jobs, using various fixtures and jigs in connection with the work and turning out accurate results regardless of the actual operation.

Although some of the factories in the automotive field work almost entirely upon standard tools, depending upon the jigs and fixtures to turn these tools to the purpose required, it would be impossible for the industry as a whole to rearrange its methods to any great extent because of the labor condition involved. Of the skilled mechanics in the country at the present time, it is safe to assume that a large majority of them are skilled mechanics only in the operation of one-purpose machines, either entirely or semi-automatic in character.

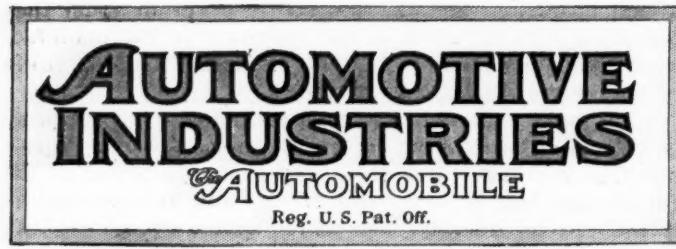
THE problem before the production manager, therefore, is likely to involve the equipment of machinery somewhat different from the present one-purpose tools and, at the same time, require less versatility and width of skill than the operation of standard tools would require. Whatever the outcome, it is evident that the future manufacturing necessities in the field will demand an analytical consideration of production costs and methods involving all the factors entering into the cost, and particularly considering the possibility of periods of less than maximum capacity and the amount of profit which can be made in the face of competitive prices under those conditions.

Armour Bushings for Spring Eyes

A NEW type of bushing for spring eyes and shackles has been brought out by the American Bronze Corporation, under the trade name "Armor" bushing. It comprises a steel jacket and a hard bronze lining, the two being so locked together that there is absolutely no chance of their working loose, it is claimed. One of the advantages of this new bushing is that the necessity for broaching or reaming after assembling in the spring or shackle is eliminated. The contraction of the bore for a

given press fit is constant and can be allowed for in advance. The thickness of the bronze lining is sufficient to take care of all permissible wear, and it is said to be much harder than the usual cast bronzes. The bushings are self-contained units, and their mechanical strength is claimed to obviate installation difficulties.

While chiefly intended for spring eyes and shackles, the field of these bushings is not limited to these parts but may be adapted to other uses.



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Remedies for Piston Slap

PISTON slap is due to the reversal in angularity of the connecting rod when the crankshaft passes through the dead center positions, at which moments, of course, the horizontal component of the connecting rod thrust also changes in direction. As the crank passes through dead center, the piston normally breaks contact with one side of the cylinder wall and establishes contact with the opposite side.

In endeavors to devise means for overcoming slap, two general lines have been followed. One consists in trying to always keep the piston in contact with one side; in other words, in opposing some superior force to the horizontal component of the connecting rod thrust, while that component is in a certain direction. Since the thrust is least during the upward strokes, at least at low speeds, it is undoubtedly best to have the counter-thrust contrary to the connecting

rod side thrust during these strokes. The aim apparently is not to keep the piston over its whole length in contact with one side of the cylinder wall, but only one end, thus producing a so-called "cocking effect." The question that arises in connection with this method is whether it is possible to produce a cocking effect sufficiently strong to achieve the desired result.

The other method referred to consists in so shaping the piston that it will fill the cylinder, even when cold, to such a degree that there can be no appreciable slap and that at the same time there is sufficient flexibility or yield in the skirt that it cannot bind in the cylinder when the engine works at its maximum temperature. This latter method is undoubtedly the most promising.

What the Elections Meant

TWO strikingly different views of the effects on business of the recent election have been voiced in the past few days. One of them betrays a lack of confidence in the American electorate which we do not share.

The National Founders Association, as might have been expected, "views with alarm" the victories of radicals at the polls and fears that they will be more dominant in the next Congress than the agricultural bloc was in the last.

"November 7 was a bad day for big business," was the way one member expressed it.

A much more hopeful view of the situation is taken by the National Business Service, which usually is sound in its deductions and which does not seem to have gone far astray in the present case.

"One of the answers which we read in the results," it says, "is that if your profits are in any way dependent on political favors and 'protection,' this election was detrimental. If, on the other hand, your profits are measured only by the merits of your products, the honesty of your purposes, and the sincerity of your desires to render to your fellow-citizens a real service, you can count this election as being beneficial."

"It has been said that the voice of the people is heard only when the load becomes onerous. During the past two years the present Congress has given small consideration to the will of the majority. True, they have shifted the load to some extent, but very little has been done to reduce its size. Then they gave the country a tariff which certainly favored a few to the detriment of the whole."

"We do not see in the returns of this election a tendency toward radicalism or any other kind of ism. If you feel that this country is drifting into dangerous water—creating situations which are dangerous to your business—we suggest that you take an inventory. Check off the conditions which appear dangerous to you and then set about to adjust your business so that it will travel with instead of against normal developments."

"When viewed under the white lights of analyzed facts, this election did little more than prove that this nation is a democracy in practice as well as in theory."

Regulating Motor Vehicle Common Carriers

INCREASING use of motor vehicles as common carriers, both of passengers and freight, has made the question of their regulation a live legislative issue in practically all States whose laws do not already cover the subject. Nearly half the States—22 to be exact—now have some such status.

Sentiment in favor of State regulation is gaining ground steadily and it is likely to become practically universal whether motor truck manufacturers want it or not, although there are substantial arguments against such a system as well as in favor of it.

So far as the public generally is concerned, the contention most frequently heard is that some means must be found to fix responsibility for highway accidents. It is a reflex of the indignation which is rolling up with the steadily lengthening casualty list. Asserting that the number of accidents is not increasing as rapidly as the number of motor vehicles in use is like telling a man who has just had one leg broken that he should be perfectly satisfied because it wasn't both.

With the public in this frame of mind, it is not surprising that the skillful and persistent propaganda of steam and electric railroads for rigid regulation of motor vehicles and higher taxation for them, has been given a willing ear. The campaign was started by the carriers but the work has been carried ahead by an army of volunteers.

No really serious or concerted effort ever has been made to combat this propaganda and present the real facts to the public. There have been just enough of truths and half truths in it to make it serious. The industry could well afford to launch a counter offensive, with facts only for ammunition, which would reach every corner of the country.

The railroads, steam and electric, contend that if they are to be regulated, there is no reason why motor vehicle common carriers shouldn't be. The traction lines, which now have taken up seriously the use of buses as adjuncts or feeders for their lines, may be hoist by their own petard, but legislators generally are bent on State regulation.

There are those, even within the industry, who believe that sane regulation wouldn't be a bad thing and they are convinced that it is coming, willy nilly. Such being the case, it is incumbent upon the industry and motor vehicle operators to agree upon some program which will be reasonably fair for all concerned.

If there is to be State control over motor vehicles which are common carriers, that control should be vested in State bodies such as public service or railroad commissions. Nothing would be gained by setting up new machinery. This may seem to be playing into the hands of the railroad interests, but as the members of such commissions become more familiar with the need for highway transport and the real demand for it, they probably will become more sympathetic in their attitude.

In most states it is necessary for a steam or electric road to obtain a certificate of convenience and necessity before it is permitted to open new lines and some such procedure should be followed, if State control is adopted, in the case of motor bus and freight lines except those already well established. If indemnity bonds are required the burden should be no heavier, in proportion, than that imposed on other forms of transportation.

Provided the States are to exercise control, they should not pass on supplementary powers to municipalities. Multiplicity of regulation does not increase efficiency, but it does add to confusion.

It is only logical that responsible persons who desire to operate independent bus or freight lines should be given exactly the same consideration and treatment by State commissions as is accorded to steam and electric companies desiring to go into this form of transportation.

If additional burdens in the form of taxation are to be imposed on motor vehicles used as common carriers they should not be so onerous that they will make profitable operation impossible. It may be conceded that vehicles which use certain streets and highways regularly should pay a greater proportion of the expense of maintaining them than vehicles which use them only occasionally, but there can be no possible excuse for taxing them off the highways.

The motor truck industry and motor vehicle operators may as well prepare for State regulation and make plans to have it established upon a basis as nearly fair to them as possible. Fighting indiscriminately against all the measures proposed does not promise the greatest degree of success. If the bills presented would impose unbearable burdens they should have some reasonable substitute prepared to offer as an alternative.

Most legislation is a compromise.

Industry Breaking Record of 1920

Output in 11 Months May Reach 2,313,000

No Let-Up in Demand—None of Major Companies Tapering Off Their Schedules

NEW YORK, Nov. 27—The automotive industry will enter December with all records in its production history broken. The eleven months' period of 1922 is expected to show an excess of approximately 100,000 cars and trucks over the output for all of 1920, which year established a record not surpassed up to this time. Estimating the November output at 200,000 at least, the aggregate for the eleven months will reach 2,313,000 compared with the 1920 total of 2,205,000. Based on this estimate the production for the full year will closely approach, if it does not reach, 2,500,000.

There is no apparent let-up in demand. Shifting of sales efforts from sections where there has been a slight decline to districts where interest is keeping to a high level has equalized sales so that a good general average is being maintained. None of the major operating companies has tapered off its production schedules, with output centering around the closed car. The demand continues strong for this type although there is evidence of renewed activity in sections where the open car carries a special appeal.

High Prices Help in South

On the Pacific Coast and in the South conditions are particularly encouraging. High prices for cotton and other farm products in the Southern States have been accompanied by a growing demand for cars which is making this section one of the most attractive in the sales field.

While dealers have not yet made serious efforts toward stocking up cars there is a trend in this direction to prevent a possible shortage in the spring. This movement probably will take more definite shape as soon as transportation facilities can be diverted from immediate needs.

No improvement is noted in the rail situation. Deliveries of cars are still behind and greater difficulty is being experienced in getting through steel shipments from producing centers.

Business in Brief

NEW YORK, Nov. 30—Cooler weather has stimulated buying and there is a marked shift in activity to jobbing and retail lines. Holiday purchasing gains steadily with the regular fall trade. Mail-order houses and department stores report more activity.

Demand for freight cars is still far in excess of supply. California reports heavy losses in grapes from scarcity of cars and bad weather. Movement of grains has improved.

Car loadings for the week of Nov. 11 were 40,918 less than the week previous, making a total of 953,909. The falling off, which began the week of Nov. 4, seems to prove that the peak loadings were in October.

Coal loadings were close to the year's record. Prices of soft coal have been easier on account of heavy production. Buyers in the West are indifferent. Supplies for the Northwest have been aided by the open weather. Buying of anthracite is better, with stiffer prices.

Higher grain prices have helped marketing of the crops and the South is benefiting by good prices for cotton and tobacco. Live stock brought generally lower prices.

Iron and steel production is running at a high figure and little price change is noted. Pig iron and scrap material were lowered again. Increased purchasing power in the centers of the coal mining regions has been shown as a reflection of higher wages.

Employment on the whole is good. Farm laborers are absorbed into mines and mills. Building industry is active.

Stocks were irregular. Announcements of stock dividends served to steady the market. Bonds were quiet but showed weakness in railroad issues.

The lack of adequate shipping facilities, aggravated by the approaching season for the closing of navigation on the Great Lakes, continues to be one of the chief obstacles confronting the industry.

(Continued on page 1100)

Gray Gives Contract for Canadian Sales

Company May Decide to Build Car There Eventually for Trade in Dominion

DETROIT, Nov. 27—Gray Motor Corp. has closed a sales agreement with William Gray Sons Campbell, Ltd., of Canada, whereby the latter company will take over the sale of the Gray cars in all parts of Canada, and will distribute them through its dealer organization. In addition to the Gray the Dort line is now being handled together with other products of subsidiaries of the parent holding company.

The closing of the contract does not indicate that the Gray car for the Canadian trade will be made at once in the Chatham plant of the Gray-Dort company, but Gray officials declare that such a policy may be instituted in about two years.

For the present the cars will carry the 35 per cent duty imposed by the Canadian tariff which will bring the price on the open models close to \$700 delivered. This will not conflict with the Gray-Dort line however, the prices on which approximate \$1,200 on the four and \$1,500 on the six.

William Gray Sons Campbell, Ltd., is second only to Ford in the manufacture of one line of cars in Canada. It was organized in 1855 by William Gray as a wagon company and entered the automobile field about seven years ago when an arrangement was made with the Dort Motor Car Co. for the manufacture of this line in Canada, under the title Gray-Dort. The company has been successful and has built up a strong distributor organization which will now be given the advantage of handling a low priced line.

In Full Swing by Jan. 1

F. L. Klingensmith, president Gray Motor Corp., will attend a big distributor convention of the Gray-Dort organization at Chatham this week at which the addition of the Gray line will be announced. No time will be lost in beginning the sale of the Gray through the Canadian organization and by Jan. 1 business is expected to be in full swing.

It is estimated that \$1,500,000 worth of cars will be placed in the Canadian market in 1923. The name Gray entering into the Canadian company title and the title Gray Motor Corp. is only a coincidence, the two families not being directly connected. The William Gray Sons, Campbell company, is now headed by Robert Gray, a son of the founder. William M. Gray, vice-president of the company, closed the sales agreement.

Predict Better Year in Closed Car Sales

Replies to Parts Questionnaire Also Show Faith in Future of Industry

NEW YORK, Nov. 27—Continuing the symposium which is gathering the opinions of those in the industry relative to next year's prospects, the Motor and Accessory Manufacturers Association this week reports that in answer to the question as to the sales outlook that the consensus of opinion is that a marked increase in the demand for closed cars and a broader distribution of medium priced and low priced vehicles will be the two principal features of 1923.

Although a few executives expressed the opinion that there will be no increase over the 1922 figures, a larger group concedes a maintenance of the present high level of business and some definitely expect a larger market for automotive products.

The representative vehicle manufacturers, whose opinions were sought, indicated a sound faith in the continuance of good business during 1923.

The opinion of Alfred Reeves, general manager of the National Automobile Chamber of Commerce, as to sales and markets, is:

I can see nothing to prevent next year's production being as big as this year's at least, with an increasing number of trucks. Renewals should require at least 1,800,000. Besides the farmer market, which should come very strong next year, we should also have the export market.

Sees Same Market in 1923

Representing the majority middle-of-the-road viewpoint is the following statement from a representative unit manufacturer in close touch with the principal car and truck builders of the country:

While we look for good business during 1923, we feel that there is going to be eliminated a number of the weaker concerns, with increased sales for the established manufacturers. Approximately the same, if not better, market should exist in 1923 as in 1922. We believe it conservative to figure on about the same market.

Sales of automobiles and motor parts generally will be determined fundamentally by the agricultural situation and the adjustment of conditions in Europe, declare most of the officials making statements for the symposium.

An automobile body builder for national distribution says:

We are looking forward to large sales and a very good market for 1923 and in the body business we are particularly optimistic with reference to the demand for closed bodies for 1923.

One of the largest accessory manufacturers sums it up this way:

The sales outlook for 1923 is about the same as 1922—volume will go to the most aggressive concerns offering the biggest dollar for dollar value.

Manufacturers Should Cultivate Markets Near Home While European Conditions Are Unsettled

By J. H. TEAGAN,
Export Manager of the Hupp Motor Car Corp.

Detroit, Nov. 28.

CHANGING political situations abroad will have an important effect on export business for 1923, and business as a whole should continue to show general improvement, the best trade coming from Australia and South America, with the British Isles and the Scandinavian countries doing well.

American car producers must study the changing political conditions as having an important effect on their business. Ireland and India normally would present a large market for cars were conditions stabilized in these countries but the open spirit of unrest in the one and the brooding disquiet in the other prevent manufacturers from going in and developing the market.

India to a large extent controls the business situation in that part of the Far East, and the Indian situation is affected to a large extent by the Near East. Were England and France able to unite on a policy, they could readily restore order in this district, and restoration of peace there would bring about a much better feeling throughout the East.

As a whole, the situation in the British Colonies is better than at home. The heavy after-war burden under which England is laboring is retarding greatly the sale of automobiles but improvement is being made. The most important forward step that has been made in the British motoring trade is the clearing out of many of the former agents who brought odium on the cars represented and their replacement by reliable men.

With the establishment of American branches in England and the development of better men in charge, credit conditions will be benefited and this will make more business. Financing companies working along lines similar to those in the United States will make the purchase of cars easier to handle, and better service will increase owner satisfaction and security.

Banks in Great Britain have been unfavorable to the industry because of the heavy losses they were compelled to take in the after-war period in connection with the liquidation and refinancing of many of the British manufacturing companies. This ill feeling has been responsible to a large extent for the slowness of the industry to make a new start. Without large production the British manufacturer is unable to meet the competition of American makers even with tariff restrictions, and they have been handicapped also by the number of manufacturers in the field.

As in America there will be a considerable weeding out of manufacturers in England and the Continent. Makers abroad will be compelled to standardize their product more than they have been in the interest of lower prices, and American manufacturers will find that standardized vehicles will be more in favor than formerly for the same reason.

American manufacturers will do well to cultivate the markets near home while conditions remain unsettled in many countries. There is a large market slowly developing in South American and Latin-American countries in which it is well to build for the future. Similarly, much pioneer work is possible in other countries, notably China, in which some part should be taken, but it is not wise at this time to undertake to do business in countries where conditions are insecure.

Speaking on behalf of the manufacturers of equipment who sell to automobile supply houses, one New York official takes this view:

We are looking forward to considerable increase in the replacement and accessory business, basing it on the fact that the majority of cars this year were sold on a credit basis, and by the spring of next year practically all of the cars will have been paid for, and the car owners will have some surplus cash to fix up their cars, both from the standpoint of appearance and utility. We find along this line a considerable increase in the sale of numerous items.

In giving out this summary of opinion, M. L. Heminway, general manager of the Motor and Accessory Manufacturers Association, points out that these predictions have particular value because

the 423 manufacturers affiliated with the association were asked to reply candidly without resorting to vague generalities based on hope rather than fact.

A similar survey made one year ago by the association, predicting a substantial increase in business for the automotive industry during 1922 along sane and conservative lines, has been substantially borne out by the developments of the current year.

STEEL BUYING HEAVY

PITTSBURGH, Nov. 27—Reports from the steel market show that there is heavier inquiry for automobile material and the producers expect that March will see more cars built than any month this year.

Body Making Plants Work at Full Blast

Probably Will Be Compelled to Run at Maximum Capacity Through Winter

MILWAUKEE, Nov. 27—While there has been a seasonal let-down in the activity of passenger car manufacturers in Milwaukee and vicinity, the manufacture of parts is going forward with much smaller shrinkage of schedules than had been expected. Shipping directions have fallen off, but production is well maintained, for the period of suspension or partial suspension at factories doubtless will be brief, and the reserve stocks now being accumulated will be needed within a relatively short time.

Parts manufacturers supplying Buick, Nash, Ford and a number of other quantity car producers are making shipments virtually on the same extensive basis as before. There is, of course, the expectancy present that declines will come, for the annual inventory season is at hand, and most factories sooner or later will call an intermission for balancing inventories and getting set for production for 1923 deliveries. Up to now, however, the manner in which patronage of parts makers has been sustained is unusually gratifying.

Slight Decrease in Employment

Taking the automotive industries of Milwaukee and immediate vicinity as a whole, employment shows a decrease of only 10.1 per cent during the past 30 days, according to the statistical department of the largest local bank. In former years the decline was steady, from the end of September to Jan. 1, and amounted to a great deal more than that noted this fall.

Shops manufacturing passenger car bodies are running full blast, with schedules calling principally for coupé and sedan types. Phaeton and roadster bodies are at present in rather negligible production, due to the tremendous call for the closed types, which has increased rather than subsided, with nearly all manufacturers still behind on deliveries of so-called closed cars. It is believed that body makers will be compelled to run at a maximum capacity all through the winter. Plant extensions as a rule will not be available much before early spring, when the additional capacity is expected to be fully occupied by the renewal of demand for open bodies.

Slight improvement is noted in railroad traffic conditions, but the unfavorable situation remains a check on deliveries all along the line.

Local Conditions

It is a source of wonderment that the retail movement of passenger cars throughout November is so active as it has proved to be. While not approaching the record demand of May and June, the sales volume in the Milwaukee ter-

ritory has held its own with September and October in a dollars-and-cents way, although perhaps the number of cars sold was somewhat smaller. This is due to the fact that the demand in the past month has been principally for closed types and sport models, which command premiums and thus sustain the money volume of trade.

Some dealers say that if it were so easy to get delivery of closed cars and sport types as it is to get roadsters and phaetons, they would feel that they had little trouble to contend with. The scarcity of coupés and sedans is actually acting as a check on selling, for prospective buyers are inclined to be very insistent upon getting their cars right away. At the same time local dealers continue to book satisfactory orders for delivery as quickly as possible. Customers are not doing as much shopping as last spring. A majority have made up their minds on the make of car and do not rush to a competitor to buy his make.

50 Applications Filed for Space in Body Show

NEW YORK, Nov. 27—More than 50 applications have been filed for space in the second national automobile body builders' show, which will be held in the Twelfth Regiment Armory, here, Jan. 8 to 13. The names of the exhibitors thus far announced are as follows:

American Chemical Paint Co., American Motor Truck Co., Art Works Shop, Charles C. Blackmore Co., Black & Decker Manufacturing Co., Blocksom & Co., Boyriven, Bridgeport Coach Lace Co., Brunsone Co., A. S. Campbell Co., Carr Fastener Co., George R. Carter Co., Cleveland Hardware Co., D'Arcy Spring Co., Doehler Die Casting Co., W. H. Duncan Co., Inc., Dura Co., Eagle-Ottawa Leather Co., Eberhard Manufacturing Co., O. M. Edwards, Co., Inc., English & Mersick Co., E. V. B. Manufacturing Co., Fleetwood Metal Body Co., Fitz Gibbon & Crisp, Inc., Haskelite Manufacturing Co., Holbrook Co., Hume Body Corp., Laidlaw, Inc., Larrabee-Deyo Motor Truck Co., Manning Abrasive Co., McGraw-Hill Co., Inc., Minnesota Mining & Manufacturing Co., Mitchell Specialty Co., Murphy Varnish Co., National Seal Co., Oxford Varnish Corp., Pantasote Co., Parsons Manufacturing Co., N. A. Petry Co., Inc., Radel Leather Mfg. Co., R. E. Rodriguez, Russell & Erwin Manufacturing Co., Sherwin-Williams Co., Soss Manufacturing Co., Standard Textile Products Co., Textileather Co., Vacu Signal Co., E. J. Thompson Co., Valentine & Co., Ware Bros. Co., Waterloo Body Co., Wilmoughby Co., Zapon Leather Cloth Co., Automobile Trimmer & Painter, and the Class Journal Co., New York City.

AUBURN DRYING DEPARTMENT

AUBURN, IND., Nov. 28—Auburn Automobile Co. has increased the capacity of its factory by the installation of a department for drying paint on bodies. The addition of this drying department gives the factory a thoroughly modern painting system. This comprises, in addition to the body drying department, a complete enameling department and a moving line of chassis through steam-heated ovens.

Ford May Build 7000 Cars Daily in Spring

Unfilled Orders on Hand Is Reported Greatest in History of Company

DETROIT, Nov. 27—Ford production next spring may run as high as 7000 to 8000 cars a day as compared with the record-breaking 5380. At present, it is said that Ford has more unfilled orders on hand than ever before in the history of the company, while the Lincoln plant is reported to be booked for two years ahead and making money at the rate of \$1,000,000 annually.

In an interview, Ford declared that his price reduction of \$50 a car on a production of 5000 daily, which represents a decrease in gross of \$250,000 a day, has not resulted in financial loss and he referred to his unfilled orders as proof.

Ford plans are said to include operating the plant at capacity the year round, making cars principally in the second and third quarters and in the first and final quarter keeping busy with the manufacture of parts for stock and replacement.

Coal for blast furnaces is being obtained at the mines at an average of \$4, while there is a proportionate saving made on steam coal. Ford believes these prices are the result of his closing his plants for four days.

Judgment Is Returned Against S. C. Pandolfo

ST. CLOUD, MINN., Nov. 28—A judgment of \$431,865 against S. C. Pandolfo, organizer of the Pan Motor Co., has been returned here by Judge John A. Roeser in favor of the bondholders, who financed the corporation. Foreclosure will begin on several buildings, houses and land to satisfy the claim. In the original organization Pandolfo issued \$350,000 gold mortgage bonds.

The Pan Motor Co. later was taken over by St. Cloud citizens, and is separate from the Pandolfo Manufacturing Co.

The foreclosed property includes residences and sites in the Pan addition to St. Cloud and the Pandolfo company. On Aug. 31 the United States Circuit Court of Appeals sustained the conviction of Pandolfo, sentenced to serve 10 years in prison and to pay a \$4,000 fine for alleged misuse of the mails in promotion of the Pan motor schemes.

NEW CARLISLE SALES POLICY

STAMFORD, CONN., Nov. 28—Operating under a new policy, that of doing away with the distributor and dealer entirely, and selling its tires direct to buyers through branches, the Carlisle Tire Co. has just opened its third branch, this one at Boston under the management of F. G. O'Reilly, for 10 years with the Goodyear Tire & Rubber Co.

Rickenbacker's Year to Show 5000 Output

Company Declares Cash Dividend of 5 Per Cent to Be Paid on February 1

DETROIT, Nov. 25—Rickenbacker Motor Car Co. will complete its first year of operation with a total business of about 5000 cars, a record which is considered entirely satisfactory. The output will be doubled in the coming year. These figures on the business of the company were furnished by President B. F. Everitt in a statement accompanying announcement of a five per cent cash dividend to be paid Feb. 1.

The declaration of the dividend evidences the financial return that the company has enjoyed despite the heavy expense of tooling-up and the overcoming of initial production losses.

Everitt declared that the company is carrying out a dividend policy of distributing a substantial part of earnings among stockholders, and that the company would guard against over-expansion by this policy. "Our plan is to build a quality car in conservative volume," he said. To further its plan for increasing its output in 1923 the company is remodelling the former shell plant which it has taken over and which will be placed in operation soon after the first of the year.

New Process May Double Manufacturing Capacity

SYRACUSE, Nov. 27—Construction of a new building to double the capacity of the present plant is being planned by the new owners of the New Process Gear Co. The details of the expansion have not been announced, but it is expected that when a survey now underway is completed a definite program will be announced.

The present plant, employing 800 men on gears for the Durant and Star cars, is not large enough to permit the manufacture of transmissions, which, it is said, T. W. Warner, Durant official, proposes. C. R. Burt, president of the local company, has been in conference with Warner.

The proposed plant will occupy the site of some of the buildings built by the original Raw Hide Gear Co., established by the late Thomas W. Meachem.

The factory has been working at capacity for many months, and in some departments night shifts have been operating in order to meet the demand. Reorganization of the company since its purchase by Durant interests is still under way.

SPERRY INSTRUMENT SOLD

NEW YORK, Nov. 27—Pioneer Instrument Co., Brooklyn, has purchased the entire aircraft instrument business of

the Lawrence Sperry Aircraft Co. and has acquired an exclusive license under its aircraft instrument patents. Licenses under certain patents of the Sperry Gyroscope Co. have also been secured. The Sperry company will continue its manufacture of airplanes at Farmingdale, L. I. The manufacture of both Sperry and Pioneer aircraft instruments will now be handled exclusively by the Pioneer company.

Nearly 52,000 Cars Built by Durant in 14 Months

NEW YORK, Nov. 27—Durant Motors reports a total of nearly 52,000 automobiles built in Durant plants within the last 14 months. Of this total 5600 were Stars. It is pointed out that the three months production of Stars is greater than the first three years of the Ford Motor Co. The Durant plant at Elizabeth, N. J., will be given over to Star production exclusively until the first of the year. The Long Island plant will continue to make both Durants and Stars.

The first New York delivery of Mason Road Kings, the Durant truck, was made Nov. 22 to the Poertner Motor Car Co., there being eight trucks in the shipment.

Columbia Aims to Build 27,000 Cars Next Year

DETROIT, Nov. 28—Columbia Motors Co. is scheduling a production of 27,000 cars for 1923 and will start operations on that basis the first of the year, according to a report to stockholders mailed this week.

Many new sales connections have been made in important cities, the statement declares, and these with the development of merchandising plans will absorb production.

Among the cities in which dealer contracts have been signed are Atlanta, Chicago, Indianapolis, Milwaukee, Philadelphia, New York, Brooklyn, Portland, Ore., Seattle, Spokane, Boston, Detroit, St. Paul, Portland, Me., and Bangor.

A strong foreign sales organization is being formed, the company states. Tentative contracts are being closed and sample car shipments made to more than 35 export territories.

SHOW LIST CHANGES

NEW YORK, Nov. 27—A revised list of national show exhibitors reports that 83 manufacturers will display cars at New York. Two have canceled their spaces—the Standard Steel Car Co. and the Templar Motors Co.

Several additions have been made to the accessory list, the newcomers including the M. L. Bayern Co., Inc., New York; Cord Tire Co., Chester, W. Va.; Grigsby-Grunno-Hinds Co., Chicago; S. S. McClelland Co., New York; T. A. Martin Co., Inc., Bridgeport, Conn.; Norling Rotary Engine Co., Chicago, and Walker Axle Co., Chicago.

Dort Debts Reduced 50 Per Cent in Year

Payments Were Made in Advance of Agreed Dates, According to Treasurer

DETROIT, Nov. 27—The Dort Motor Car Co. during the year has made a 50 per cent reduction in its indebtedness of more than \$1,500,000, according to a statement by F. A. Aldrich, treasurer, to financial and commercial companies. This is regarded as highly satisfactory by the company in view of depression at the outset of the fiscal year, Nov. 1, 1921.

Besides operating with satisfactory volume and caring for current business, the company paid out \$832,329 on its old indebtedness, payments being made in advance of the agreed dates. It also paid the matured installment of \$200,000 on its bond issue together with interest on the entire issue.

Total money paid including current operating disbursements and other expenditures approximated \$1,250,000, all of which came out of liquidating inventories and ordinary operations except \$300,000 from the sale of new stock. The bond issue was reduced another \$100,000 by the sale of unused and obsolete machinery.

1922 Dividends of Hall Lamp Total 25 Per Cent

DETROIT, Nov. 24—With a 5 per cent dividend to be paid to stockholders on Dec. 15, the C. M. Hall Lamp Co. will have made a total cash dividend payment of 25 per cent during the year. Earnings for the first ten months have approximated \$500,000 before provision for taxes. Net earnings for the year are expected to approximate more than 50 per cent on the company's capital stock of \$1,000,000.

The balance sheet as of Sept. 30 showed total assets of \$1,637,201 with current assets of \$1,145,011 against current liabilities of \$43,067, a ratio of 26 to 1, and indicating a net working capital of \$1,101,944. Of current assets \$119,388 was in cash, \$200,000 in U. S. treasury certificates, and \$122,000 in bonds. Bills receivable were \$299,135 and inventories \$389,664.

Unfilled orders on the company's books Sept. 30 were \$809,690 and business already lined up will require capacity operation through 1923.

SHOP EQUIPMENT CREDIT PLAN

CHICAGO, Nov. 27—Canedy-Otto Manufacturing Co. of Chicago Heights, manufacturer of shop equipment, has put into operation a credit plan that permits the sale of its equipment by jobbers on time payments. The plan is underwritten by the Continental Guaranty Corp., New York.

Cut Made in Prices of Cadillac Models

Reductions Due to Increased Business During Year, Says President Rice

DETROIT, Nov. 24—The Cadillac Motor Car Co. has made reductions of \$215 to \$265 on open styles and from \$150 to \$260 on closed models, effective Dec. 1. The new prices are declared by President H. H. Rice to be the result of largely increased business during the year and to anticipations of still further increases in 1923.

In connection with the price change, the company declares that the type 61 will be continued without change.

The new and former prices are as follows:

	Old Prices	New Prices
Roadster	\$3,100	\$2,885
Phaeton	3,150	2,885
Touring	3,150	2,885
Coupe (5-pass.)	3,925	3,750
Victoria	3,875	3,675
Sedan	4,100	3,950
Suburban	4,250	3,990
Limousine	4,580	4,300
Imperial Limousine	4,600	4,400

Under the new scale, the company places all of its open models in a price class under \$3,000, and brings its four largest production models in the closed car type under \$4,000. The company has been extending its sales and production with this thought largely in view. Sales in the first ten and a half months of the year have exceeded any best previous year. With extensions to plant and increased personnel, facilities for production in 1923 will reach a new high point.

Stutz Produces Closed Models as Part of Line

INDIANAPOLIS, Nov. 27—For the first time in its history, the Stutz Motor Car Co. is producing closed bodies as a regular part of the line. The two models are a touring sedan at \$4,450 and a four passenger coupe at \$3,490. The touring sedan carries four passengers and is of a four-door type with square cornered doors. The front doors hinge forward and the tonneau door hinges at the rear, giving a drawing room effect when the doors are open.

The seating arrangement is conventional with a one-piece cushion, both front and rear, allowing for an extra passenger. The windshield is of the wide vision type, with a leather sun visor. The design provides for a trunk deck and built-in luggage rack in the rear.

The upholstery is covered with a special Windsor weave material of strong texture. The springs are Marshall. The body frame is made from ash and elm and the body to the belt line is covered with 14 gage aluminum.

The door windows are raised and lowered with Ternstedt window regulat-

ors. The tonneau windows have lifts of the Dura notch type. The tonneau has foot hassocks built, and doors to these hassocks conceal carrying spaces for jack and tools.

The coupe is of a four passenger type and has two full doors hinged at the rear. The seating arrangement is staggered, the driver's seat extending ahead of the passenger seat, which seats two people. One person is accommodated on a single leg auxiliary seat which folds under the instrument board when not in use. The deck is built similarly to that of the roadster to carry extra tires. A special equipment for spare tires can be set on the rear end of the frame and the trunk, which carries two suitcases, can be put in the deck.

Highway Research Board Holds Its Annual Meeting

WASHINGTON, Nov. 28—The Advisory Board on Highway Research held its annual meeting here Nov. 23 and 24. Tractive resistance, traffic conditions, highway finance and wind resistance tests were among the chief topics of automotive interest discussed.

The board aims to co-ordinate and summarize the results of highway research throughout the country, but does not actively conduct research activities.

Haynes Price Increases Range from \$55 to \$280

KOKOMO, IND., Nov. 27—Price increases ranging from \$55 to \$280 on six of its models have been announced by the Haynes Automobile Co.

The revisions are as follows:

	"55" Standard	
	Old Price	New Price
5-pass. phaeton.....	\$1,495	\$1,695
5-pass. sedan.....	2,395	2,595

	"55" Sport	
	Old Price	New Price
5-pass. phaeton.....	\$1,895	\$1,950

	"75" Standard	
	Old Price	New Price
7-pass. phaeton.....	\$2,395	\$2,595
5-pass. brougham.....	3,095	3,350
7-pass. sedan.....	3,395	3,675

	"75" Sport (New Model)	
	Price	
7-pass. phaeton.....	\$2,700	
4-pass. phaeton.....	2,700	
5-pass. brougham.....	3,475	

G. M. SERVICE MEN ORGANIZED

DETROIT, Nov. 27—Service managers and other men interested in the service problems of General Motors divisions have formed an organization to discuss individual questions and to pool their knowledge for the benefit of the service station and the customer. Under the chairmanship of M. W. Franklin, the organization has already held its first meeting.

Bessemer Cuts List on 2 Lighter Models

Reduction Announced of \$285 on 1-1½-Ton and \$405 on 1½-2 Ton Truck

PHILADELPHIA, Nov. 27—Bessemer Motor Truck Co. announces price reductions on its two light models. The reduction amounts to \$285 on the 1 to 1½ ton model and \$405 on the 1½ to 2 ton model.

Ralph D. Mock, general manager of the company, states that these reductions are not accompanied by any change in chassis specifications.

Complete new prices for all models are as follows:

	Old Price	New Price
1—1½ ton.....	\$1,735	\$1,450
1½—2 ton.....	2,395	1,990
2½—3 ton.....	2,895	2,895
4—5 ton.....	3,695	3,695

The Bessemer plant reports greater sales in November than in any preceding month this year and also the appointment of a number of new dealers and distributors. The Bessemer policy of maintaining factory branches in certain principal cities will be continued and the number increased. All factory branches will carry new trucks in stock for the convenience of dealers.

Preparations are now being made for occupying the company's new plant at Holmesburg Junction in Philadelphia, and additions to the personnel will be made in line with the enlarged production program which will be carried out in 1923, now that the merger with the American Motors Corp. of Plainfield, N. J., is proposed.

Maxwell Builds Sport Roadster and Phaeton

DETROIT, Nov. 28—Two sport models are added to the Maxwell line. A sport phaeton at \$985 and a sport roadster at \$960. The bodies are painted Chester hunt red with running gear and disk wheels in black. The additional equipments include drum-type head lamps and tie-rod and parking lamps. The radiators, Moto-Meter and door handles are in nickel, the latter having a black aluminum inlay. An aluminum bead runs around the hood at the cowl.

The upholstery is long-grained patent leather and the top is olive drab with rubber insert. The equipment also includes a spare cord tire which is encased in an envelope type olive drab duck tire cover. The left front fender of the phaeton model is designed and countersunk to receive the tire.

On the roadster the extra carrier is on the rear. Nickeled spring bumpers are furnished both front and rear. An innovation is the assurance against theft of the Moto-Meter for one year.

The phaeton is equipped with a large trunk and dust cover mounted on nickel plated trunk rack at the rear.

No Decline Evident in Parts Business

Activity Expected Through Win- ter—Car Makers Ask Imme- diate Deliveries

NEW YORK, Nov. 27—The healthy condition and prosperity of the parts makers of the country are indicated in the reports received from members of the Motor and Accessory Manufacturers Association, which tell of many orders, good collections and a promise of continued manufacturing activity throughout the winter.

Car makers are buying closely, it is true, but inasmuch as there is no break in the continuity of purchasing, the parts people are well satisfied that their own plants will not lack for business during what is generally looked upon as the dull time of the year. A particularly gratifying sign is noted in the filing of orders from car makers. In many cases these orders are followed by telegrams asking for immediate delivery, which indicates that the builders of automobiles intend pushing production as fast as possible.

October was a particularly good month for the parts makers. Reports from members of the M. A. M. A. show that the purchases for that month amounted to \$38,753,800, an increase of 3.90 per cent over September business. This brings the total of sales for the 10 months of 1922 to \$347,609,220, or \$132,916,148 more than for the corresponding period of 1921. This October produced \$16,700,473 more business than did October, 1921.

Past due accounts in October show a decrease of 17.93 per cent over September, while total notes outstanding have decreased 2.09 per cent.

Moreland Motor Truck Enters Electric Market

LOS ANGELES, Nov. 27—The Moreland Motor Truck Co. of Burbank has entered the electric truck field. It will produce assembled units in one, two and three-ton sizes. The electric trucks embody General Electric motors and controllers and Hobbs batteries, the latter made in Los Angeles.

Only the one-ton model is now on the market, but the other sizes will follow soon. The company intends to maintain service and charging stations at all its branch points.

CORRECTION

A dispatch from Syracuse published in AUTOMOTIVE INDUSTRIES Oct. 12 in connection with the Covert Gear Co., Inc., securing an order from the State Supreme Court setting aside a judgment of \$42,747 obtained by the New Process Gear Co., stated that "both concerns are in bankruptcy." An error was made in this statement, in that the Covert Gear

SALES BY M. A. M. A. MEMBERS SHOW INCREASE OF 3.90 PER CENT OVER SEPTEMBER

NEW YORK, Nov. 27—Reports from members of the Motor and Accessory Manufacturers Association show that sales in October, 1922, increased 3.90 per cent over the preceding month and that for the first 10 months of this year the total sales amounted to \$347,609,220, or \$132,916,148 more than for the corresponding period of 1921.

The following table shows the sales by members of the association, the total past due accounts and the total of notes held for all the months of 1921 and the first 10 months of 1922:

	Total 1921 Sales	Per Cent Change	Total Past Due	Per Cent Change	Total Notes Outstanding	Per Cent Change
January	\$6,264,587	\$8,099,727	\$4,359,871
February	10,408,962	66.15 Inc.	6,717,165	17.07 Dec.	6,069,118	39.08 Inc.
March	20,120,386	93.30 Inc.	5,603,992	16.57 Dec.	5,069,877	16.38 Dec.
April	26,746,580	32.93 Inc.	5,352,271	4.49 Dec.	5,371,086	5.94 Inc.
May	26,781,350	.13 Inc.	4,505,176	15.64 Dec.	4,460,355	16.77 Dec.
June	22,703,414	15.19 Dec.	4,720,973	4.79 Inc.	4,012,670	10.37 Dec.
July	23,096,214	1.68 Inc.	5,242,046	10.79 Inc.	3,690,154	7.90 Dec.
August	23,397,640	1.31 Inc.	4,348,790	17.06 Dec.	3,494,510	5.30 Dec.
September	23,141,891	1.09 Inc.	4,358,545	.22 Inc.	3,677,500	5.24 Inc.
October	22,053,327	4.70 Dec.	4,512,680	3.54 Inc.	3,463,500	5.82 Dec.
November	18,998,490	13.85 Dec.	4,352,000	3.56 Dec.	3,661,900	5.73 Inc.
December	14,349,750	24.47 Dec.	4,220,450	3.02 Dec.	3,384,250	7.58 Dec.
1922						
January	17,320,000	20.61 Inc.	4,450,000	5.45 Inc.	3,146,000	7.02 Dec.
February	22,720,000	31.17 Inc.	4,070,000	8.57 Dec.	3,483,000	10.74 Inc.
March	28,670,000	26.14 Inc.	2,890,000	28.86 Dec.	2,657,000	23.69 Dec.
April	33,830,000	18.07 Inc.	3,000,000	2.00 Inc.	2,500,000	1.05 Dec.
May	43,700,000	28.06 Inc.	2,900,000	2.75 Dec.	2,450,000	6.05 Dec.
June	42,000,000	3.85 Dec.	2,840,000	1.25 Dec.	2,320,000	5.00 Dec.
July	41,001,670	2.42 Dec.	3,423,850	20.42 Inc.	2,217,670	4.49 Dec.
August	43,700,000	5.00 Inc.	3,705,000	8.21 Inc.	2,398,350	8.15 Inc.
September	37,300,050	13.36 Dec.	4,220,400	13.91 Inc.	2,658,800	10.86 Inc.
October	38,753,800	3.90 Inc.	3,463,850	17.93 Dec.	2,603,100	2.09 Dec.

Co. is not in bankruptcy and never has been.

The judgment secured by the New Process Gear Corp. was obtained by default due to the absence from his office of President Gloetner and the company's failure to reply in the time allotted in the bill of complaint. Covert Gear's explanation to the court reopened the case, and the company filed a counter-claim for \$40,651.

The Covert Gear Co. is a concern long and prominently identified with automobile construction, and one whose financial integrity never has been questioned in courts. It was one of those included in the recent merger of automotive interests into the Associated Motors Industries, Inc.

Builder of Many Detroit Plants Dies in Accident

DETROIT, Nov. 25.—W. E. Wood, head of the E. E. Wood Construction Co., which built many of the important automobile plants of the district, and widely known in the industry, was killed when his car skidded into a ditch near Flint.

He founded the Wolverine Tractor Co., which operated in Saginaw several years ago, and besides his construction work, was interested in or owned, several large parts companies and warehouses.

He is credited with the construction of the Ford and Dodge Brothers plants, Detroit; the Buick plant, Flint, and several other large automobile factories. He was an intimate friend of W. C. Durant and was a part owner with him in a large tract of cut-over timber land which they used as a private hunting reserve.

Government Starts New World Survey

WASHINGTON, Nov. 28—A new world automobile survey of foreign markets for American made automobiles has been undertaken by the automotive division of the Department of Commerce.

The primary purpose of the survey is to eliminate the uncertainty of foreign markets in the automotive field and to establish the dull and active seasons in the purchase of automobiles and accessories in any given country.

To do this the Department has sent out questionnaires to more than 1000 representatives of the Department of Commerce in foreign fields, with a request that they secure data showing the number of automobiles imported, the absorption each month and general information as to trade customs, etc.

To make the service practicable it is the plan of the department to have this world survey supplemented each three months by additional reports. These reports when received are then to be sent to automobile exporting concerns.

The questionnaires have been sent out and the returns, it is expected, will begin to come in about March 1, so that the world market survey can be begun on July 1. From that date on the survey will be brought up to date every three months.

BARLEY TREASURER DIES

DETROIT, Nov. 24—Charles E. Stephenson, treasurer of the Barley Motor Car Co., died this week at his home in Kalamazoo after a short illness.

Wills and Creditors Agree to Receiver

Company, Declared Solvent, to
Continue Production—Liabilities \$8,000,000

DETROIT, Nov. 28—The financial difficulties of C. H. Wills & Co., manufacturers of the Wills-Sainte Claire car, culminated to-day in the appointment of the Security Trust Co. of this city as receiver. The action is understood to have been taken by agreement between C. Harold Wills, president of the company, and bank and merchandise creditors. It followed recent meetings of creditors in this city and Cleveland.

No recent statement of the assets and liabilities of the company is available. The total liabilities are estimated to be between \$8,000,000 and \$9,000,000, including stock issued to outsiders, bank and merchandise bills. It is understood that the banking indebtedness approximates \$5,500,000. The principal creditors are Kidder, Peabody & Co., the Old Colony National Bank and the National Shawmut Bank, all of Boston. It was reported several months ago that the Wills company had arranged with the Boston bankers for a revolving fund of \$2,400,000, which was expected to meet their needs for some time.

Wills Says Company Is Solvent

In a statement in reference to the receivership, Wills declared that the company was solvent and that court action was taken as a preliminary to rehabilitating it and placing it on a strong financial basis. He asserted that production would continue without interruption.

Wills has devoted practically all his time for several weeks past to the financial affairs of his company. He had several conferences with Henry Ford, and these led to frequent reports that the Ford interests proposed to take over the Wills company. This was later denied emphatically by Henry Ford himself, although he had a conference with Wills and the company's bankers. Ford holds a strong personal friendship for Wills, who became widely known throughout the industry because of his excellent work for the Ford company.

Incorporated in 1920

C. H. Wills & Co. was incorporated in Delaware July 6, 1920. Its plant is located on the St. Claire River, near Detroit, at Marysville, which was built by the Wills interests as an industrial suburb. The plant has a capacity of 20,000 cars a year. A large number of the Wills-Sainte Claire cars have been sold, and they have given the utmost in satisfaction to their owners, but the company was unfortunate in getting under way just when the depression began two years ago.

The capital stock of the company consists of 300,000 shares of common, no

par value; \$5,000,000 in first preferred and \$5,000,000 in second preferred. The stock outstanding includes all the common, \$2,000,000 of preferred and \$2,000,000 of the second preferred. The company has no funded debt. All the second preferred and part of the common are held by Wills and his associates. First preferred to the amount of \$1,000,000 was offered at \$100 par in July, 1920, with a 50 per cent bonus in common.

The officers of the company are: C. H. Wills, president; J. R. Lee, first vice-president; K. B. Alexander, second vice-president; Charles Morgana, third vice-president; F. D. Stone, secretary and F. P. Book, treasurer.

Tire Makers Not Likely to Import Liquid Rubber

NEW YORK, Nov. 27—Will the American tire manufacturer continue to import his rubber in blocks and sheets or will he use the new method just reported from Holland, by which it will be possible to ship rubber as a liquid? The answer seems to be that for the next few years at least he will make no change.

Public attention was called to the new idea by a cable to the *New York Times* from The Hague, which reported that rubber growers have perfected a process whereby it is possible to keep rubber in the liquid state in which it comes from the trees by adding an anti-coagulating substance, thus obviating the working operation of the rubber into blocks and sheets later on by the rubber estates.

This is called the Stephenson process and is not unknown in this country. Several of the tire manufacturing concerns are experimenting with it, but there seems little chance of its adoption at present. The opinion appears to be that, even if the process has merit, it would be too costly to junk the expensive machinery now used to handle rubber in blocks and sheets, even though the saving amounted to two or three cents a pound with liquid shipments.

Industry Breaking Output Record Established in 1920

(Continued from page 1094)

Trucks are moving forward steadily in production, light delivery vehicles meeting with the greatest popularity. Conditions in this branch of the industry are showing marked improvement. Tire manufacturers are moving toward increased output, to establish stocks of the finished products. Parts makers report conditions excellent with orders booked far in excess of their expectations for this season.

While the fuel situation has eased greatly there is still a lack of bituminous coal, which calls for the greatest economy in its use, but this shortage is not so serious as to be the cause of great concern.

Pierce-Arrow Names Forbes As President

Succeeds Col. Charles Clifton,
Who Will Continue Chairman
of Board

BUFFALO, Nov. 28—Continuing Col. Charles Clifton as chairman of the board, the Pierce-Arrow Motor Car Co. has named Myron E. Forbes president of the company, thus relieving Col. Clifton of the detail work and leaving him a free hand to map out and direct the policies of Pierce-Arrow. Forbes has been prominently identified with the company as treasurer, vice-president and chief executive. Under his direction the company has shown gratifying progress, inventories having been reduced to normal and overhead cut materially. He will be succeeded as treasurer by S. O. Fellows, formerly comptroller.

This division of labor is interpreted to mean that Col. Clifton has completed his work of reconstruction undertaken two years ago. Prior to that time he had retired from the presidency to become chairman of the board alone, but the affairs of the company were in such shape that the directors prevailed upon him to return to the head of affairs and reorganize things. With that in mind he has put in a busy two years. Now, it is said, the company is in good shape, and the Colonel feels that he can give up the presidency and remain as chairman of the board.

Col. Clifton is greatly interested in public welfare work in Buffalo and desires more time for his work. He also will continue to serve as president of the N. A. C. C.

Industry to Recommend Nation's Road Program

WASHINGTON, Nov. 28—Unanimous support of the nation's highway construction program is to be urged by the constituted representatives of the automobile industry at the forthcoming convention of the American Association of State Highway Officials in Kansas City Dec. 5.

The industry will be represented at the meeting by the Conference Committee of the N. A. C. C., composed by O. J. Russell, president of the board of Mack Trucks, Inc.; Windsor T. White, president, White Motor Co.; Roy D. Chapin, chairman of the committee and president of the Hudson Motor Car Co.; Alvan Macauley, president of the Packard Motor Car Co., and Pyke Johnson, Washington representative of the N. A. C. C.

CAROLINA CHEVROLET BRANCH

CHARLOTTE, N. C., Nov. 27—Carrying out the program of expansion that has been adopted by the Chevrolet Motor Co., a factory branch to handle the distribution of all cars for North and South Carolina will be opened in Charlotte.

Men of the Industry and What They Are Doing

Stalnaker Heads Earl Sales

W. E. Stalnaker, formerly distributor for the Premier Motor Car Co. in Chicago and vice-president and sales manager of the former Pathfinder Co., Indianapolis, has been named general sales manager of Earl Motors, Inc., by President George C. Scobie. He has assumed immediate charge of the sales department and is mapping out plans for 1923 which are designed to give Earl the most extensive representation it has had. Territories both East and West will be carefully mapped out, and many important dealer connections will be signed in the time before and during the New York and Chicago shows. Stalnaker will attend both shows personally and will renew many acquaintances made during his former connections in the industry. During the war Stalnaker was a major of artillery, joining the service when the United States entered the war. Since leaving the service he has been active in other enterprises.

Rickenbacker Returns Home

E. V. Rickenbacker, vice-president of the Rickenbacker Motor Co., returned this week from his European trip on the Olympic. The famous aviator spent two months abroad on his honeymoon, attending the foreign shows and picking up ideas on the progress in both automobile and airplane construction.

Indiana Truck Names Gargett

F. W. Gargett has been named assistant to the president of the Indiana Truck Corp. His duties will be looking after the branches and the subsidiaries of the company. Gargett served formerly with the Transport Truck Co., in the capacity of factory manager.

James R. Anderson Resigns

James R. Anderson, assistant general manager of the Kenosha, Wis., works of the American Brass Co., division of the Anaconda Copper Co., has tendered his resignation, to take effect Jan. 1. No reason is given publicly by Anderson, and he has not announced his plans for the future. He was associated with the Kenosha plant 19 years.

Henderson Tire Changes

F. P. Harrington has been made general sales manager of the Henderson Tire & Rubber Co., Inc., Columbus. Prior to the change Harrington was with the Dayton Rubber Manufacturing Co., Dayton, as assistant sales manager for two years, and had also been connected with the sales department of the Miller Rubber Co., for about 10 years.

Robert H. McKintry, for a number of years connected with the Miller Rubber Co., has been made special sales repre-

sentative in western Ohio, Indiana and Michigan.

J. H. Redfern, formerly branch manager of the Dayton Rubber Manufacturing Co. at Denver, has been made special representative covering the States of North and South Dakota, Wyoming, Idaho, Montana, Colorado, Utah, Arizona and New Mexico.

Harry J. Crawford has been named special Pacific Coast representative covering the States of California, Washington, Oregon and Nevada.

Packard Makes Change

H. J. Crain has been appointed assistant mechanical superintendent of the Packard Motor Car Co., and A. F. Reese, special equipment engineer in the sales department. C. S. Richardson has resigned as district manager to become Omaha distributor.

Mock Is Bessemer Manager

Following the report of a week ago that the Bessemer Motor Truck Co. and the American Motors Corp. would merge under the name of the Bessemer-American Motor Corp., comes the announcement that Ralph D. Mock has become general manager of the Bessemer Motor Truck Co. He is known to the industry through his service as vice-president of the Hydraulic Steel Co. of Cleveland, with which he was associated for a decade and also through past activities with the Motor and Accessory Manufacturers Associations. Mock was associated with others in the organization of the American Motors Corp. of New Jersey, which has resulted in that company's financial rehabilitation.

Bourne Joins Agency

Stephen Bourne has resigned as assistant to the president of the Wills Sainte Claire Co. of Pennsylvania to join the advertising agency of Thomas F. Logan, Inc., New York, Chicago and Washington, as director of merchandising. During the war Bourne was secretary and trustee of the United States Shipping Board Emergency Fleet Corp. at Washington.

Bristol, Conn., Honors Hughes

Frederick G. Hughes, vice-president and general manager of the New Departure Manufacturing Co., has been elected president of the Bristol Chamber of Commerce, Bristol, Conn.

Studying "Indian" Development

C. B. Franklin, production engineer of the Hendeel Manufacturing Co., is on a trip through the central West and Pacific Coast states getting suggestions for engineering development of the Indian motorcycle.

Road Builders Have Convention Program

Design, Construction, Maintenance and Traffic Will Be Discussed

CHICAGO, Nov. 25—The program has been announced for the Thirteenth American Good Roads Congress, to be held at the Congress Hotel, here, Jan. 16, 17, 18 and 19 under the auspices of the American Road Builders' Association. The opening session will be marked by an address on "The Future" by Thomas H. MacDonald, chief of the United States Bureau of Public Roads.

The afternoon of the first day will be devoted to the subject of road design, with MacDonald in the chair. Among the speakers will be Clifford Olds, State highway engineer of Illinois; Lloyd Aldrich, consulting engineer, San Francisco, Cal.; A. T. Goldbeck, engineer of tests, U. S. Bureau of Public Roads; H. F. Clemmer, testing engineer, Division of Highways, Springfield, Ill.; Vernon M. Pierce, district engineer, U. S. Bureau of Public Roads, and C. M. Upham, State highway engineer, Raleigh, N. C.

Construction to Be Taken Up

Wednesday will be devoted to subjects having to do with construction, with J. H. Cranford, president of the Cranford Paving Co., Washington, D. C., in the chair.

The subject for Thursday morning will be "Maintenance," and the chairman will be A. R. Hirst, State highway engineer of Wisconsin. A number of speakers will discuss the maintenance problems of various types of roads.

The subject for Thursday afternoon will be "Traffic," with Thomas J. Wasser, State highway engineer of New Jersey, as chairman. One of the speakers at this session, on the subject of "Changes Needed in Motor Vehicles Legislation and License Fees," will be Harry Meixell, Jr., of the N. A. C. C.

Finance and miscellaneous subjects will be discussed at the closing session Friday morning.

VICTOR RUBBER WINS SUIT

BOSTON, Nov. 25—The Victor Rubber Co. of Springfield, Ohio, was awarded damages of \$15,022 in the Federal District Court here to-day, following a trial lasting several days, in which the Grow Tire Co. of Boston was defendant. The suit was based upon a contract made to supply the Grow company with a large amount of Egyptian cotton. The Grow company, it was alleged, refused to abide by the contract.

Bus Interests Join in One Association

National Body Formed with Offices in New York and E. B. Burritt Manager

NEW YORK, Nov. 27—The National Motor Transport Association, with headquarters in the Fisk Building, 250 West 57th Street, New York City, has been launched, with E. B. Burritt, for eight years secretary of the American Electric Railway Association, as the prime mover in bringing together the bus interests. There is no connection with the trolley branch of transportation as might be thought from the fact that Burritt was identified with it so many years.

Patrick Healey Is President

Organization was completed at a meeting held in New York at which Patrick Healey, president of the Connecticut Motor Stage Association, Waterbury, Conn., was elected president; W. E. Travis, president of the Motor Carriers Association of California, San Francisco, vice-president; R. E. McCollum, president of the Ohio Motor Bus Owners Association, Columbus, vice-president; William P. Killeen, vice-president and general manager of the Washington Rapid Transit Co., Washington, D. C., vice-president; E. B. Burritt, secretary and general manager; and Alexander Spring, Waterbury, treasurer.

There will be three classes of membership. Class A is for operators, with dues one-tenth of one per cent of the annual gross earnings; class B, for manufacturers and parts concerns, with dues of \$300 a year; and associate memberships at \$10 a year.

Briefly, the object of the new association is "to develop the business of transporting passengers and merchandise by motor vehicles operating on public highways between fixed terminals and on regular schedules to the end that it may serve to the fullest extent the best interest of the public."

Taxicab Operators Barred

Operators of taxicabs and "jitneys" necessarily are barred from membership because the eligibility clause calls for buses running on a regular schedule and between fixed terminals. In other words, it is an organization for carriers by which is meant bus operators.

As yet Burritt has been unable to gather reliable data as to the bus field. Conservatively, it is estimated there are about 40,000 buses in operation in the country. It is thought there are about 10,000 operating companies, of which possibly 5000 may be regarded as going concerns, that is, companies operating in a business-like way and making money.

It is Burritt's idea to bring these companies into the fold, organizing along lines somewhat similar to the National Automobile Chamber of Commerce.

RADIO WILL GUIDE TRUCKS, FENN SAYS

NEW YORK, Nov. 29—Radio as a means for controlling the operation of motor truck fleets in the near future was predicted last night by F. W. Fenn, secretary of the motor truck committee of the National Automobile Chamber of Commerce, whose discourse on the evolution of transportation was broadcasted from the WJZ station at Newark, N. J.

"Undoubtedly as time goes on," Fenn said, "motor truck fleets will be dispatched from one end of the country to the other by means of the radio, with resulting efficiency and economy to shippers and operators alike. The radio will make it possible for the home office to keep in touch with its operators on all routes, permitting it to take advantage of emergency orders and re-route its trucks in case of storms and highway blockades.

"In other words, the radio will be the eyes through which the traffic managers in our major cities will be permitted to watch closely the work of their operators for the benefit of business in general."

Legislation is one of the things that will be watched carefully.

One of the first bits of attempted legislation that will be fought is the uniform law suggested at the October meeting of the American Electric Railway Association, which the bus men feel contains many drastic clauses which they would have modified. It is thought that pressure of bus competition may have led the trolley companies to suggest that motor vehicles having pneumatic tires shall pay one cent per ton mile of travel over public highways and motor vehicles with solid tires one and one-half cents.

Barlow Starts Movement to Produce Steam Buses

CLEVELAND, Nov. 27—Application for articles of incorporation for the Barlow Steam Engineering Co. has been filed with the Secretary of State at Columbus, marking the first step toward placing on the market a device for generating steam for motor power, invented by Lester E. Barlow.

Barlow has interested the Cleveland Chamber of Commerce in his proposition. It is said the organization will seek to secure the backing of local bankers and capitalists and will endeavor to secure a local plant for the enterprise.

It is Barlow's intention to organize a company to build steam-driven motor buses, after which he will incorporate another company to manufacture passenger cars. It is not his plan, however, to confine the use of his device to his own companies—he will grant patent rights to such other car makers as desire to use the invention.

Truck Association Re-elects Pulcher

Also Increases Its Board of Directors So That It Includes 15 Members

DETROIT, Nov. 27—Coincident with the shortening of its name from the National Association of Motor Truck Industries to the Motor Truck Industries, Inc., at a meeting of the organization here, the board of directors of the association was increased to 15 members, nine truck manufacturers and six parts makers, to permit of more effective handling of the association's business.

M. L. Pulcher, president of the Federal Motor Truck Co., will continue as president with H. T. Boulden, vice-president of the Selden Truck Corp. as first vice-president; Fred Glover, president and general manager Timken-Detroit Axle Co., as second vice-president; Don F. Whitaker, general manager of the association, as secretary and general manager, and A. S. More, president of the Denby Motor Truck Co., as treasurer.

Board of Directors Chosen

The board of directors, in addition to the officers, includes: G. A. Dana, president, Spicer Sheldon Axle Co.; B. A. Gramm, Gramm-Bernstein Truck Co.; M. A. Holmes, president, Transport Truck Co.; W. J. Kyser, president, Acme Truck Co.; T. R. Lippard, president, Stewart Motor Co.; A. E. Parson, treasurer, Brown Lipe Co.; J. W. Stephenson, president, Indiana Truck Co.; L. M. Viles, president, Buda Co.; F. E. Wilder, vice-president, Gemmer Manufacturing Co.; F. E. Williams, president, Garford Motor Truck Co., and G. W. Yeoman, vice-president, Continental Motors Corp.

A service committee headed by George Dow, service manager of Federal, will be named which will make an immediate study of the used truck situation. Much of the difficulty in moving used trucks is thought to be due to the inability of the dealer to rebuild them owing to lack of money. The committee will make recommendations to the directors on Dec. 20, who will decide whether aid in putting trucks in a salable condition is needed.

Opponents of Rear Light Law to Be Given Hearing

BOSTON, Nov. 27—As a result of a petition signed by a number of Boston motor car dealers and motorists, a hearing will take place before the Governor's Council at the State House here on Dec. 6 in opposition to the proposed new rear light law. Since the announcement of the regulations and the approval of some of the lamps, a number of dealers received word from their factories that they would not get cars with new lamps to meet the Massachusetts specifications. So far only six automobile companies have had lamps approved.

Reeves Sees Year's Output As 2,400,000

Of This He Says, Following Tour of Plants, 10 Per Cent Will Be Trucks

NEW YORK, Nov. 27—After spending two weeks on the road visiting from 25 to 30 plants in Ohio, Indiana, Illinois and Michigan, Alfred Reeves, general manager of the National Automobile Chamber of Commerce, is back at his desk again, convinced, as a result of his trip, that 1922 production will reach the record-breaking total of 2,400,000, of which approximately 10 per cent will be trucks.

"I found that business generally has had a chance to get its second wind, live down many of the mistakes of the past and get set for 1923," commented Reeves. "Next year promises to excel 1922, provided we can get enough closed bodies. That's the rub. The whole industry now has a new market in the demand for the closed car.

Closed Car Output Expanding

"This market will increase rapidly as the prices get closer to the open car prices and especially where the roads are improved. Closed car production in 1919 was 10 per cent of the total; in 1920, 17 per cent; in 1921, 22 per cent; while this year it will exceed 25 per cent, with the last quarter's production running 31 per cent of the total. In time it is expected that more than half the production will be the closed or year-round type."

Reeves said further:

After visiting so many of our factories I am convinced that our industry now has an excess capacity for all its needs. It can make 3,000,000 vehicles if hard pressed during any year. This means that there is very little chance for any new companies that may be launched. New dealers are hard to get and the old ones are standing by the standard lines.

Next year will find engineering and production on a very efficient basis but distribution will be the big problem for all manufacturers. While thousands of dealers have gone out of business, the ranks have been pretty well replaced by new ones so we now have more than 33,000 merchants retailing motor cars and trucks, all of whom must be aided by the manufacturer in connection with financing his stocks and passing the vehicles on to the public.

Readjustments Responsible

The big market we are enjoying now is the result of manufacturers taking their readjustments quickly, taking necessary losses and putting prices low enough to insure volume. To-day's values are the greatest in the history of the industry and with increasing costs for materials and labor some price increases are not unlikely. We had considerable buying by those who should have bought cars in 1921, plus those necessary to replace the worn out production of 1919 and 1917. The 1917 production was 1,868,947.

We will see still greater production next

CLASSES BUS LINE AS RAIL "FEEDER"

WASHINGTON, Nov. 25—Bus lines were classified as "feeders" to electric traction lines in a decision of the Public Utilities Commission of the District of Columbia, denying the application of the Washington Rapid Transit Co., a bus operator, to extend its Rhode Island Avenue route.

In the opinion of the Commission there is a legitimate field for bus service in Washington, but "this does not lie in the multiplication of lines or of vehicles reaching the heart of the city. It lies, rather, in providing service in extension of the street car lines into territory so thinly settled as not to justify the large investment necessary for street railway service."

year, especially during the first six months, provided closed bodies enough are available. The industry normally makes 25 per cent of its year's production in the first quarter, 31 per cent in the second, 24 per cent in the third and 20 per cent in the last quarter. The last quarter this year will be better than the average.

Farmer buying will make for an increased production next year. His crops this year will bring a billion and a half dollars more than last and he must have cars and trucks.

The truck industry is more promising than it has been for some time but it needs more and better dealers and the elimination of some bad practices that have crept in during the depression, especially the selling of trucks on too small a first payment, with too long a time for full payment.

Fisher Reports Quarter's Surplus to Be \$2,852,964

DETROIT, Nov. 29—Fisher Body Corp. and subsidiaries exclusive of the Ohio company, report for the three months ended Oct. 31, last, a surplus of \$2,852,964, after charges and Federal taxes, equal after preferred dividends to \$5.70 a share earned for the 500,000 shares of no par value common stock outstanding. In the previous three months surplus of \$1,733,433, or \$3.46 a share on the common, was reported, and in the corresponding period last year, surplus of \$1,939,541, or at the rate of \$3.75 a share on the common, was shown.

For the six months ended Oct. 31, surplus of \$4,586,394 remained after preferred dividends, equivalent to \$9.16 a share on the common, as compared with \$3,151,777, or \$6.06 a share, in the same period a year ago.

For the quarter ended Oct. 30 last, the Fisher Body Co. of Ohio reported net earnings of \$329,293, after taxes, depreciation and interest. This is equivalent to \$1.29 a share on the 100,000 shares of no par value common stock, after allowing for preferred dividends.

New York Suggests Pedestrian Control

Officers Would Clear Sidewalks as Means of Meeting Traffic Problem

NEW YORK, Nov. 27—Traffic cops on the sidewalks to control pedestrians and headlights for the officers are two reforms being considered by Police Commissioner Enright in his efforts to solve the congestion problem. With this end in view he is drafting a set of sidewalk traffic rules which will apply only to pedestrians and which will be rigidly enforced, he says.

These are only two of the relief measures that the Commissioner has in mind. With New York doubling the number of its automobiles every three years, he realizes that drastic steps must be taken to make it possible for residents of the city to use the streets and sidewalks.

Stores with Arcade Effects

So serious does he consider the situation that he says it may be necessary to eliminate the sidewalks on Fifth Avenue and Broadway and give the whole width of the streets to vehicular traffic. To care for pedestrians he would build the sidewalks along the first floors of the stores and office buildings, which at the same time would permit the stores to display goods in an arcade effect.

Enright also suggests taking down the Second and Sixth Avenue elevated lines and placing them underground with four tracks each. An elevated structure along West Street, the most congested thoroughfare in the city, is favored. This, Enright thinks, should be at least 80 feet wide and extend from the Battery to Seventy-second Street, with runways that would connect West End Avenue and Riverside Drive with Broadway. A few of the cross streets, particularly those leading to the four bridges across East River, should be widened.

Enright has given the pedestrian control idea considerable thought, and as this plan is outlined he would keep people moving and break up sidewalk groups. Persons persisting in standing and talking on the sidewalks may be handed a summons to appear in court.

Radiolite for Officers

Because of the number of traffic policemen who have been killed and injured by being struck by automobiles, Enright is considering equipping his traffic cop with a radiolite hat band or put an electric light on his cap. An electrically lighted baton is another idea. Having a high powered calcium light continually shine on the traffic cop at night, as is done in some of the smaller cities, is being considered. In the daytime, Enright thinks, accidents may be avoided by placing the bluecoat on an elevated platform.

California Reports Gain in Truck Sales

Cars Improve Also as More Are Being Shipped by Eastern Manufacturers

SAN FRANCISCO, Nov. 28—California automobile and motor truck dealers had another banner month of sales in October, according to figures just gathered by *Motor Registration News*, of Oakland. The total of automobile and truck registrations for October, 1922, was 14,158, of which 12,563 were automobiles and 1595 trucks, an increase of 19 per cent over the registrations of October, 1921.

When the shortage of cars felt by all the dealers is taken into consideration, these figures show a very healthy condition throughout the industry in California. November has shown improvement over October, due largely to the increased shipment of cars into the State by eastern manufacturers.

All Sections Show Gain

Northern California, with a total registration of 6204 automotive vehicles for October, 1922, shows 5450 passenger cars and 751 trucks, an increase of 17 per cent over the registrations of October, 1921. Southern California showed a net gain of 27 per cent for October, 1922, over October, 1921, with 7113 passenger cars and 841 trucks registered for the month just closed.

Trucks recorded a greater percentage of gain in registrations throughout the State than passenger cars, with a 59 per cent increase. The truck gain in northern California was 98 per cent and in southern California 35 per cent. Los Angeles led all the counties of the State, with total sales in passenger cars of 5165 for October, 1922, while the next thirteen counties combined showed sales of 5163 passenger cars, or two less than Los Angeles County alone.

From a percentage standpoint, however, Kern County, which stood tenth in the list as to number of sales, was first of the counties of the State, with an increase for October, 1922, over the same month of 1921, of 62 per cent.

Mobile Conditions Improve

MOBILE, ALA., Nov. 28—Conditions in the territory surrounding Mobile are much improved, and an excellent trade for the winter months is expected. With Alabama back in the position of the third cotton producing State in the South, and with a crop estimated to be in the neighborhood of 850,000 bales, which will be sold at an excellent price and which will be required almost as soon as bought, Mobile cotton dealing and shipping concerns are looking for an excellent business this winter and next spring, at least.

This added to general improvement in all lines is making for an excellent sale of automobiles and kindred lines in this

territory, and there is no reason why this territory should not be one of the leading automobile buying sections for some months to come. The fact that from all appearances Mississippi will be the second largest cotton producing State in the South also helps the prospects of Mobile as a market.

Texas Sales Keep Up

DALLAS, TEXAS, Nov. 27—While the bulk of the crops have been marketed and the farmers of Texas are now preparing for another bumper production, the peak of the automobile buying does not appear to have been passed.

Retailers, despite the approach of winter and the inclement weather, have not noticed any lull in the buying of cars, tires and accessories. In fact November sales were about the same as those of October, and October was one of the banner months of the year.

In Dallas the number of retail sales has been around 100 per day, and the distributors have been placing cars with their dealers about as rapidly as they could obtain them.

The Fort Worth retailers report that the sales for November were about equal to those of October and that indications are the December sales will be as great.

Houston dealers reported increased sales for November, probably due to the fact that the automobile show, extending over a dozen days, was held during the month. Sales at Galveston were about what they were in October. At San Antonio the sales were holding up, the retailers reported.

Business in Boston Good

BOSTON, Nov. 27—Business continues at a reasonable pace, due in a large measure to mild weather. It has allowed a number of dealers to continue selling open cars. Now, however, they are beginning to concentrate on closed models. While the demand is ahead of the supply generally, some of the dealers are very nearly normal in filling their orders.

New York Salon Will Show 26 Makes of Automobiles

NEW YORK, Nov. 27—Twenty-six makes of cars will be on display in the eighteenth annual Automobile Salon, which will open in the Hotel Commodore Sunday evening. England, France, Belgium, Italy, Germany, Austria, Spain and the United States will be represented. In addition 12 custom body concerns will exhibit.

Those exhibiting cars are: Benz, Brewster, Cunningham, Daniels, Duesenberg, Fiat, Hispano-Suiza, Hotchkiss, Isotta-Fraschini, Lanchester, Mercedes, Minerva, Panhard, Rolls-Royce, Rubay, Steyr, Sunbeam, Voisin, Winton.

Coachmakers will exhibit: Cadillac, LaFayette, Lincoln, Locomobile, Marmon, Packard, Peerless.

Coachwork exhibits will be made by: Brewster, Brooks-Ostruik, De Causee, Demarest, Fleetwood, Healey, Holbrook, Hume, Judkins, Le Baron, Locke, Rubay.

London Show Rouses Interest Near End

Attendance One Day Breaks Records—Biggest Demand Is for Small Cars

LONDON, Nov. 11 (by mail)—Quite a remarkable change occurred on the third day of the Show at Olympia and White City, which closes to-day. The attendance was poor on the first two days and the amount of business done was very disappointing, being much below anticipations. But on Monday (the third day) and thenceforward, marked improvement in both respects was obvious.

The attendance was greater than last year on each of the last six days, while on Wednesday all records were broken, over 80,000 people paying for admission; the crowd, however, was divided between the two sections, so that the pressure on space was not so great as in 1920 when Olympia alone was used.

Optimism Reigns at Close

It is impossible to give any definite intimation concerning the amount of business done, but so far as the best known makers were concerned, it was clearly evident that optimism had taken the place of something approaching pessimism on the opening days. Some firms were freely expressing the opinion that 1923 would be a record year for them, and among these were makers of high-grade as well as others specializing in low-priced and small cars.

But the majority of the business done was in small cars or those of moderate price, varying from 10 to 14 hp. and from £200 to £500. The new 14 hp. Wolseley and Crossley four-passenger cars at £525 and £475, respectively, were in obvious favor; the Morris fours, in two finishes, £255 and £350, were in demand and appeared to justify the planning of a 12,000 output, while the new 8 hp. Humber at £275 and the 11.4 hp. at £525 with the new overhead inlet engine were selling freely.

Other makers with established reputations and popular types of cars were equally well placed, but the demand for cars selling over £600 and for cheap full-sized models continued small until the end of the show. Economy in operating costs remained the outstanding feature of the public demand as of the show as a whole, though many buyers still hold off believing or hoping that prices have further to fall in the near future.

ASSOCIATION CHANGES NAME

CHICAGO, Nov. 25—A new name, Automotive Manufacturers' Association, was adopted at a meeting here this week by the organization heretofore known as the Association of Automotive Equipment Manufacturers. New constitution and by-laws also were adopted.

Government Starts Road Surface Tests

Will Seek to Learn Cause of Waving Found in Bituminous Mixtures

WASHINGTON, Nov. 28—A series of road tests have been begun by the Bureau of Public Roads at the Arlington Experiment Station here to determine the cause of waving in bituminous road surfaces. A circular track is being used, composed of 27 sections of asphaltic concrete of different mixtures.

Profile measurements of the circular road were secured before the tests were begun. Measurements will be taken at frequent intervals as the test progresses in order to determine the rate of formation of inequalities in the surface.

The tests are being made under solid rubber-tired wheels loaded with 600 pounds per inch of width of tire or approximately that of a 5-ton truck, traveling at a speed of 20 m.p.h. The device used will be guided by wheels traveling on rails and is electrically driven, the power being transmitted to one of the wheels, used to represent the traffic, which will make it act in exactly the same manner as the drive wheel of a truck.

The wear test of the circular track consists of 61 sections of concrete, and the ultimate result of the test will not only show what causes waves in bituminous road surfacing, but will also show the best mixtures of concrete and other road material. The test will require six months to complete, and it is planned to run the machine ten hours a day.

Marketing Associations Will Meet in Washington

WASHINGTON, Nov. 27—The first national convention of Co-operative Marketing Associations will be held here Dec. 14, 15 and 16, with headquarters at the New Willard Hotel. More than 200 member associations have already been invited to send representatives.

The purpose of the convention is two-fold—the problem of transportation for the various associations, and rural credits legislation. A definite program is now being arranged.

Manufacturers Endorse Canadian Road Project

DETROIT, Nov. 24—A resolution endorsing the plan of the Canadian Good Roads Association to obtain from the Federal Government a further grant of \$20,000,000 to assist provinces in road building and to provide an extension of time to provinces unable to take full advantage of the dominion appropriation within the time limit, was passed at a meeting of representative manufacturers in Windsor this week.

The meeting was addressed by W. R. Campbell, vice-president and treasurer

of Ford Motor Co. of Canada, Ltd.; Hon. J. L. Perron, K. C., minister of highways for the province of Quebec, new president of the Canadian Good Roads Association; Hon. F. C. Biggs, minister of highways for Ontario; W. Sampson, president of the Canadian Automobile Association; and S. L. Suries, chairman of the executive committee of the Canadian Good Roads Association.

Congress Has Measure for Truck Mail Routes

WASHINGTON, Nov. 27—Representative M. Clyde Kelly of Pennsylvania has introduced a bill in the House providing for an appropriation of \$100,000 to be used in the establishment of motor truck mail routes to facilitate the collection and delivery of food products. Kelly states that establishing these routes will result in the average saving of 20 per cent in the cost of food stuffs to consumers and will increase the farmer's profits by 15 per cent, both savings resulting from the decreased cost of transportation from farm to market.

According to Kelly, the Post Office Department has all the trucks it needs at the present and all that is necessary now is authority to put them on the road. Appropriation of \$100,000 is intended to pay for the cost of establishing routes and operating the trucks.

Gain Made in Per Capita Earnings During October

WASHINGTON, Nov. 25—Comparison of employment for September and October in 118 automobile manufacturing plants shows an increase of nine-tenths of 1 per cent in the amount of the pay-roll, but a decrease of 5.9 per cent in the number on the pay-roll in a one-week period. Thirty-four of the 43 industries listed by the Bureau of Labor Statistics show increases in the total amount of their pay-roll in October.

The pay-roll of these 118 establishments for one week in September amounted to \$5,483,856, as compared with \$5,534,807 in October, when the number on the pay-roll was 171,892. The 48 establishments manufacturing automobile tires reported 45,017 on the pay-rolls in October, an increase of two-tenths of 1 per cent over the preceding month, although the amount of the pay-roll decreased 1.4 per cent.

The per capita earnings in the automobile industry increased 7.3 per cent in October as compared with September, while the earnings in the tire industry fell off 1.6 per cent.

PIEDMONT MOTOR PLANT SOLD

LYNCHBURG, VA., Nov. 28—The plant of the Piedmont Motor Car Co. has been sold at auction under a deed of trust and was bought in by the First National Bank of Lynchburg, beneficiary. A. Leslie Stephens of Lynchburg is in charge of the property for the bank and is endeavoring to find a private purchaser for the plant.

Road Making Gains Momentum in Peru

Highway Campaign Advances— Exchange Better and Crops Yield Good Prices

LIMA, PERU, Nov. 8 (by mail)—Exchange, which fell below \$4 for the Peruvian pound in September, during the latter part of October rose to its old level of \$4, and starts out November at \$4.03. Par value is \$4.84. During 1920 exchange ranged from \$4.91 to \$3.96; in 1921, from \$4.12 to \$3.15; in the years immediately preceding the Great War exchange ranged closed to par, and did not vary greatly in the course of the year; during the period following the disastrous war between Chile and Peru that ended 1883, exchange was far worse than it is today.

(Editor's Note.—Peruvian exchange was quoted at \$4.20 at New York on Nov. 21, this being its highest quotation in two years.)

Newspaper Begins Campaign

Rising prices for cotton and sugar, two of Peru's chief exports, are adding to the encouraging feeling given by a rising exchange; they themselves contributed largely to the improvement in exchange. An encouraging feature in the automobile world is the increasing impetus that the movement in favor of good roads is taking. Since six months ago one of the papers of the capital began a campaign in favor of more and better roads. This campaign is now extending to the provinces. From Piura to Puno, and from Ica to Huancavelica, the press of the provinces is echoing and re-echoing the sentiment in favor of better roads that first found utterance in the capital.

Bus Traffic Extended

Bus or automobile passenger traffic is becoming more extended throughout the Republic. Service now exists between Piura and Morropón and Talara in the north of Peru, with the intention of extending the automobile route to reach Ecuador. If this is done, it will be one of the first international automobile services in South America. There is also an automobile line between Chocope and Puerto Chicama, near Trujillo, in the center of the coast region. In the South there is automotive transportation from Ica to the bathing resorts of the Huéga and La Victoria, and to the therapeutic baths of Huacachina.

The new automobile year begins in Peru Dec. 1, one month ahead of the calendar year.

TRUCKS GO TO AUSTRALIA

SPRINGFIELD, OHIO, Nov. 27—Ten motor trucks were shipped Saturday from the Springfield works of the International Harvester Co. to Australia. The plant is still keeping up with its schedule of 25 trucks per day.

French Car Exports 10,112 in 9 Months

Of These 195 Were Shipped Here
—France Took 2139 Units
from America

PARIS, Nov. 15 (*by mail*)—France exported 10,112 automobiles having a value of 321,423,000 francs, during the first nine months of the present year. Compared with the corresponding period of last year, the values show a deficit of 82,487,000 francs.

Great Britain continued to be the best client of France, with Belgium second and the United States sixth on the list. The following is the number of French automobiles exported to the various countries:

England	3,672
Belgium	2,709
Algeria	1,119
Switzerland	576
Morocco	228
U. S. A.	195
Germany	136
Japan	130
Indo-China	155
Tunisia	90
Other countries	1,102
	10,112

The greatest volume of export business was done during the month of August, when 1534 automobiles were shipped abroad. The lowest number was in September, with a total of 950.

French automobile imports totaled 2773 units during the first nine months of 1922, of which number 2139 came from the United States, 423 from Italy, 115 from Belgium, 31 from England, and 65 from other countries. The value of these imports is 35,340,000 francs, being an increase of 9,460,000 francs compared with the corresponding period of a year ago. The excess value of French automobile exports over imports is 285,083,000 francs.

More Motorcycles Imported

During this period motorcycles to a value of 2,338,000 francs were imported into France, showing an increase compared with a year ago. The exports were 3,019,000 francs for motorcycles, a slight decrease from last year.

Airplanes to a value of 13,157,000 francs were exported from France during the initial nine months of the year. For the same period of 1921 the value was 28,615,000 francs. The value of flying boats exported during this period was 459,000 francs, compared with 775,000 francs in 1921.

STEEL COMPANY BUYS SITE

DETROIT, Nov. 25—The Michigan Steel Corp., newly formed for the manufacture of steel sheets for automobile parts, has bought a site near Detroit and will begin construction of a plant at once. The plant will cost about about

\$1,000,000 and have an initial capacity of about 3000 tons monthly.

George R. Fink, formerly with the West Fenn Steel Co., Pittsburgh, is president and treasurer. Other officers are F. B. Lovejoy, New York, chairman of the board; F. H. Jones, New York, vice-president, and H. M. Steele, Detroit, formerly with Newton Steel Co., Newton Falls, Ohio, second vice-president.

French Trucks Compete in Long Endurance Test

PARIS, Nov. 18 (*by mail*)—After a technical examination, all the French trucks which took part in the 26-day military endurance test around Versailles have been found to be in such satisfactory condition that they can be recommended for Government subsidies. The makes represented are Renault, Saurer, Dewald, Seemia, and Berliet. The trucks are 7½-ton types which, while designed for commercial haulage, have been found suitable for the road transportation of military tanks.

Another military competition, for agricultural tractors capable of being used for hauling guns across country, was held on the old battle front just north of Soissons. The firms entered are Citroen, Mistral, Renault, Ara, and Seemia. Citroen has entered his rubber creeper band type of machine, but this having been objected to by the military commission, the machines competed non-officially. The military requirements are a four wheel drive or creeper band tractor capable of passing over broken country.

Farm Equipment Sales Heads Discuss Problems

CHICAGO, Nov. 28—The Sales Managers' Department of the National Association of Farm Equipment Manufacturers held their annual meeting at the Auditorium Hotel. "Advertising Its Relation to Sales" was the first subject commented upon and brought suggestions on connecting the advertising with the sales.

"How to Cut Sales Overhead" was another topic talked on while "Trade Ethics" brought the morning session to a close. "The Business Outlook for 1923" opened the afternoon meeting and was delivered in the form of an address by E. P. Farewell of Babson's Statistical Organization.

"1923 Prospects as I View Them" were expressions of what each member thought of the coming year. Optimism predominated in the talks.

TO TEST "BLUE SKY" LAW

CHICAGO, Nov. 25—Alleging that the Illinois securities law, commonly called the "blue sky" law, is unconstitutional, Charles H. Gill, inventor of a gearless transmission, has filed suit in the United States District Court, asking that the Secretary of State and Attorney General of Illinois be restrained from interfering with the sale of rights in his patents.

INDUSTRIAL NOTES

Latex Tire & Rubber Co. at Fond du Lac, Wis., will make its first quarterly dividend payment Feb. 1, 1923, following the establishment of a production record equalled by few if any of the younger tire companies which engaged in business before the period of depression made its effect felt. The announcement followed the receipt of word that agents of the company closed a raw material order that places the concern in an enviable position for the coming six months, during which time it is generally believed that the price of tires and other rubber products is due for an increase.

Harley-Davidson Motor Co., Milwaukee, will break ground Dec. 1 for a new heat-treating building, to be 80 x 145 ft., of brick and steel, one story and basement. One of the main shop buildings has just been enlarged by the addition of another story. Orders are reported to be increasing steadily and export business is especially active.

H. A. Waldron, General Motors Building, Detroit, has been appointed by the National Seal Co., Inc., of Brooklyn, N. Y., as its western sales manager for the sales of Sears-Cross locks for automobile bodies and its general line of automobile hardware. Waldron takes the place of T. P. C. Forbes, who formerly represented the company.

F. Rassmann Manufacturing Co., Beaver Dam, Wis., manufacturer of barn and stable equipment, has decided to enter two new lines, one being the manufacture of malleable disk wheels for Ford and other light cars, and the other the production of children's coaster wagons with malleable disk wheels.

Petroleum Motors Co., Rockford, Ill., reports an order for \$112,000 worth of the engines from a Chicago truck company. One unit of the Rockford plant has been erected and machinery has been installed. Production of 20 engines a day is forecast when the plant is in operation.

Wisconsin Gray Iron Foundry Co., Milwaukee, is enlarging its foundry and core-room and installing considerable new equipment. New core-making machinery and cleaning room equipment will be installed as part of the general improvement plan.

Van Metal Wheel Co., San Francisco, has been organized to handle dealers' sales of the Van hollow spoke malleable and aluminum wheels in California. The new company is controlled by interests operating the Lambert tire agency in that city.

Wm. R. Johnston Manufacturing Co., manufacturer of windshield wings, mirrors, curtains and other automobile equipment, has occupied its new factory at 1300-1340 Fletcher Street, Chicago, where its production capacity is greatly enlarged.

Anderson Motor Co. announces the appointment of Melchoir, Armstrong & Dessaix, Ltd., 116 North Broad Street, west, New York City, as export agent.

YELLOW CAB LENGTHENS DAY

CHICAGO, Nov. 27—The Yellow Cab Manufacturing Co. has increased the capacity of its plant by lengthening the working hours from 9 to 10 hours with a full Saturday. Ground also has been broken for a new factory which will manufacture motor buses for the Chicago Motor Bus Co. and operators in other cities. This plant will be ready by February with an initial capacity of five buses a week.

Roster of Electric Service Body Grows

New Directory to Show Increase— No 1922 Dues for Members Joining Now

DETROIT, Nov. 24—The directory of the Automotive Electric Service Association for 1923 will show a large increase in members over the total for this year. In this connection Secretary D. W. Burke is sending out a letter to prospective members urging them to file their applications in time to be listed in the new booklet.

Because of the lateness of the season, the association will not assess dues for 1922 on members joining now, but suggests that they approximate their business for 1922 and, in making application, request that the dues apply for 1923. Dues are assessed according to volume of business, the five classes being as follows: Under \$25,000, \$10; \$25,000 to \$50,000, \$20; \$50,000 and less than \$100,000, \$30; \$100,000 and less than \$250,000, \$50; \$250,000 and over, \$75. Initiation fees will be suspended until Jan. 1.

Plans for the annual convention of the association have determined the Congress Hotel, Chicago, Florentine Room, as the place and Jan. 29, 30 and 31 as the dates. The board of governors will meet on the opening day and the general sessions will be on the two latter days. A joint session with the Automotive Electrical Association, the manufacturer's body, will be held on the closing afternoon. All electrical equipment dealers are invited to attend the open sessions. Over 200 members will attend the closed sessions.

A questionnaire to car dealers is now being circulated by the association to determine the effectiveness of the service that the equipment dealers have been rendering and requesting information for improvement. It will also serve to show manufacturers how equipment dealers and car dealers are co-operating and afford opportunities to put the service on the best basis from the owner viewpoint.

Has Plan for Buying Parts with Trade Acceptances

NEW YORK, Nov. 27—Parts manufacturers are interested in a plan evolved by an automobile maker designed to keep the wheels turning in the parts plants during the dull season and at the same time enable the car builder to store up sufficient equipment to care for increased production in the spring.

Estimating that the average parts maker's plant operates at about 50 per cent capacity during December, January and February, and when the spring rush opens tries to crowd into a few months a production which could be distributed uniformly over each month under the new

plan, this car maker agrees to accept sufficient material to build 1000 cars, each shipment to be paid for with trade acceptances for a period of 60, 90 and 120 days.

This step is proposed because this particular maker believes that next spring there will be an unprecedented demand for cars and if he has a surplus of equipment over and above his anticipated needs he will be able to increase his output and meet the needs of his dealers. He also figures that the parts people will benefit by being able to operate their plants to capacity during what heretofore has been the dull season.

Several of the parts concerns approached with this proposition are understood to have agreed with the logic of the idea. They figure that the trade acceptances can be used through almost any banking connection and that everyone in the transaction will benefit thereby.

FINANCIAL NOTES

General Battery & Supply Co. of Coal City, Ill., a \$250,000 manufacturing concern, will occupy the Fuller factory building, East Moline, next month. Forty men will be employed when the plant is opened, and this force increased to 100 under capacity production. It will handle 15,000 primary and 1500 automobile storage batteries a month. The company was organized in 1919 and last year did a \$225,000 business. Its officers are: Fred H. Jones, Chicago, president, and William A. Biesmann, Galena, vice-president and superintendent of production.

Cincinnati Milling Machine Co. has received authority from the secretary of state to increase its capital to \$6,000,000. Frederick A. Geier, president of the company, says that the move was made in preparation for future expansion and has no immediate significance. The capital will be increased to \$3,000,000 only, Geier says, of which half will be in common stock and half in preferred. The present capitalization of the company is \$1,500,000.

More Cities Show Desire to Construct Speedways

SAN FRANCISCO, Nov. 27—Detroit, Altoona and Norfolk are negotiating with Jack Prince, builder of the speedways at Cotati, Fresno and near San Francisco, for the construction of wooden bowls for automobile racing. This is only one of several interesting statements made by Fred Wagner, dean of starters, who stopped in San Francisco recently on his way to the Thanksgiving Day Races at the Beverley Hills track, Los Angeles.

The four cities have filed applications with the American Automobile Association for sanctions to hold automobile races, according to Wagner, thus indicating that the plans for the bowls and the financing of their construction had proceeded to a definite point in each of the cities. Prince is now building a speedway at San Diego, which will be ready for try-outs shortly after Jan. 1.

BANK CREDITS

Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.

Last week rates for call money ranged between 4 per cent and 5½ per cent, as compared with a range of 3½ per cent to 5 per cent in the preceding week. Funds were in free supply, and several large banks appeared in the market as lenders. There was no change noted in the rate for fixed-date money, 5 per cent being quoted for all periods from 60 days to six months, the same as in the preceding week, and very little business was transacted. The prime commercial rate remained unchanged at 4½ to 4% per cent.

Bradstreet's food index number, based on the wholesale price per pound of 31 articles used for food, stood at \$3.46 last week, as compared with \$3.42 in the preceding week and \$2.95 in the week ending Nov. 23, 1921. Last week's index marked a gain of 1.1 per cent over the preceding week and 17.2 per cent over the corresponding week last year.

Based upon car loadings at the mines, the estimated total coal production for the week ending Nov. 18 was 13,200,000 tons, of which 11,100,000 was bituminous and 2,100,000 anthracite. This compares with 10,076,000 tons of bituminous and 1,863,000 tons of anthracite, actual production in the previous week.

Although freight car loadings for the week ending Nov. 11 were 40,918 less than for the week of Nov. 4, they were 198,132 cars more than in the corresponding week of 1921. There is still a shortage of freight cars, as is evidenced by the fact that on Nov. 8 there was need for 174,498 cars more than could be supplied. This was a decrease, however, of 4741 cars from the demand in excess of supply on Oct. 31.

The Federal Reserve statement as of Nov. 22, 1922, showed increases of \$14,477,000 in gold reserves and \$13,923,000 in total reserves. Bills on hand decreased \$42,103,000, and total earning assets, \$70,698,000. Total deposits showed a decline of \$44,522,000 and Federal Reserve notes in circulation, \$21,828,000. The reserve ratio advanced from 75.2 per cent to 76.7 per cent.

Chevrolet Assembly Plant in Texas Will Be Dropped

FORT WORTH, TEXAS, Nov. 28—The Fort Worth assembly plant of the Chevrolet Motor Co., one of the largest plants of this kind in the Southwest, is to be disposed of by the General Motors Corp., according to advices received by local officials.

The announcement of the intention to dispose of the plant here merely said "the manufacturing plans of the company have been changed and for good reasons the assembly plant will be disposed of." It is believed the machinery and materials will be moved elsewhere and the other property sold.

Calendar

SHOWS

Dec. 3-9—New York, Eighteenth Annual Automobile Salon, Commodore Hotel.

Jan. 6-13—New York, National Automobile Show, Grand Central Palace, under auspices of National Automobile Chamber of Commerce.

Jan. 8-13—New York, Second National Automobile Body Builders Show, Twelfth Regiment Armory, under the auspices of the Automobile Body Builders Association.

Jan. 27-Feb. 3—Chicago, Annual Automobile Salon.

Jan. 27-Feb. 3—Chicago, National Automobile Show, under auspices of National Automobile Chamber of Commerce, Coliseum and First Regiment Armory.

FOREIGN SHOWS

Nov. 25-Dec. 4—London (Olympia), Cycle and Motor-cycle Show, British Cycle Motors, The Tower, Warwick Road, Coventry.

Dec. 15-Jan. 2—Paris, Aero-nautical Salon, Grand Palace. Chambre Syndicale des Industries Aero-nautiques, 9 Rue Anatole de la Forge.

Jan. 13-24—Brussels, Sixteenth International Automobile and Cycle Exposition, Palais du Cinquantenaire.

April 1-July, 1923—Gothenburg, Sweden, International Automobile Exhibition, Sponsored by the Royal Automobile Club of Sweden.

May 10—Berlin—Grunewald, German Grand Prix.

RACES

CONVENTIONS

Dec. 6-8—St. Louis, Third Annual Meeting of the American Petroleum Institute, Hotel Statler.

Jan. 15-19—Chicago, Thirteenth American Good Roads Congress and Fourteenth National Good Roads Show.

Jan. 29-31—Chicago, Annual Meeting, Automobile Electric Service Association, Congress Hotel.

Dec. 14—Speaker, Charles P. Grimes, Research Engineer, H. H. Franklin Manufacturing Co.; Subject, Air Cooling in Automotive Engines.

S. A. E. MEETINGS

Metropolitan Section

March 15—Speaker, William P. Kennedy, President, Kennedy Engineering Corp.; Subject, Trolley Buses and Flexible Vehicles for Street Railway Service.

April 19—Speaker, Edw. E. La Schum, General Superintendent, Motor Vehicle Equipment, American Railway Express Co.; Subject, Engineering Features of Fleet Operation.

May 17—Speaker, F. P. Gilligan, Secretary, Henry Souther Engineering Co., Subject, Metallic Materials for Automotive Work.

Other Meetings

Jan. 9-12—New York, Annual Meeting.

Jan. 31—Chicago Meeting and Dinner of the Society at the Congress Hotel.

Hudson Covers Field With Shortened Line

DETROIT, Nov. 27—Hudson Motor Car Co. is now offering a line of automobiles which covers practically the entire medium-priced field with only seven models, Essex phaeton, cabriolet and coach and Hudson speedster, phaeton, coach and sedan. The prices range from \$1,045 to \$2,295, and in the Hudson plan each model is in a distinctive price class, the Essex closed models ceasing with the coach at \$1,245 and the Hudson open models beginning with the speedster at \$1,525.

The models and prices representing the complete line now are, the Essex phaeton, (five passenger), \$1,045; Essex cabriolet, (single seat enclosed model), \$1,145; Essex coach, (five passenger), \$1,245; Hudson speedster, (four passenger), \$1,525; Hudson phaeton, (five passenger), \$1,575; Hudson coach, (five passenger enclosed), \$1,625; Hudson sedan, (seven passenger), \$2,295.

Less Benefit in Policy

In this arrangement is seen a merchandising policy which manufacturers and dealers of the country will watch with great interest, and which Hudson believes will prove of great benefit to the buying policy. By it the company will confine its manufacturing and selling efforts to a small number of cars, all of which are fast selling, and yet cover the entire field in the medium price. Each model is designed to fit a particular need, and the simplification of manufacturing problems results in prices most favorable to the buyer.

For the dealer it supplies a wide choice of cars without loading him with models with only limited buying appeal, the company declares. Factory officials declare that such a line will yield a dealer a larger net profit on a year's business than one containing more varieties of

cars, some of which would be less easy to handle than others. Fitting in with the policy is the new dealer financing plan which has been selected after two years of study of such plans, and which is declared unusually economical and dependable in operation.

Warehousemen Invite Industry to Meeting

CLEVELAND, Nov. 27—Car, truck, parts and tire manufacturers who make use of the public commercial warehouse for distribution have received invitations to attend the third annual convention of the Shippers' Warehousing and Distributing Association, at the Hotel Hollenden on Dec. 4 and 5. The organization comprises traffic representatives of manufacturing companies which have warehousing problems in distribution.

Taxation, carload handling costs, methods of charging for storage, standardization of forms, pool car routing and the economics of distribution are some of the subjects on the program of the convention, which will be addressed on Dec. 5 by William A. Durgin of the Department of Commerce.

Details regarding the convention may be obtained from the association's secretary, Kent B. Stiles, editor of *Distribution & Warehousing*, 239 West 39th Street, New York City.

Issue Gasoline Coupons Pending Ruling on Tax

GREENVILLE, S. C., Nov. 27—Pending a ruling by the South Carolina Supreme Court on the constitutionality of the two cents per gallon tax enacted at the last session of the General Assembly, various independent oil companies of the state will issue two cent coupons to customers, which would be cashed in event the court decides against the tax.

Railroads Extending Store-Door Delivery

NEW YORK, Nov. 27—That the plan of store-door deliveries is making progress among the railroads is evidenced by the invitation extended by the Pennsylvania Railroad to officials of the National Automobile Chamber of Commerce to visit Kearney, N. J., Friday and inspect the experimental yard the company has established there.

Kearney is between Hackensack and Passaic and is the geographical center for the port district. The Pennsylvania has tried out store-door delivery for perishable stuff in a small way and believes it has great possibilities. By breaking bulk at this New Jersey point and trucking to New York, it is believed the public will be served much more quickly and at no more expense than the present way. In Kearney, it believes it has an ideal location for a yard such as would be necessary in putting the system into force.

Other Roads Interested

The Lehigh Valley road also is said to be contemplating trying such an arrangement with its yard at Bayonne, while the Erie has had the system operating more than nine months, breaking bulk at Jersey City and having the freight shipped by the United States Trucking Corp. to four terminals in New York City, where the consignee sends for it.

F. W. Fenn, secretary of the motor truck committee of the N. A. C. C., in speaking of the store-door delivery plan, says:

I regard the interest the Pennsylvania is showing in the store-door delivery system as most promising. I can look ahead to the time when all railroads will be using it, at which time an immense new market will be opened for the truck industry. I think the railroads will then buy liberally and maintain big fleets.